

BOTANICAL ABSTRACTS

A monthly serial furnishing abstracts and citations of publications in the international field of botany in its broadest sense

PUBLISHED MONTHLY UNDER THE DIRECTION OF

THE BOARD OF CONTROL OF BOTANICAL ABSTRACTS, INC.

A democratically constituted organization, with members representing many societies interested in plants.

THE SOCIETIES NOW REPRESENTED

AND

THE MEMBERS OF THE BOARD OF CONTROL

(The Executive Committees for 1920 are indicated by asterisks)

American Association for the Advancement of Science, Section G.

*B. E. LIVINGSTON, Johns Hopkins University, Baltimore, Maryland.

A. F. BLAKESLEE, Station for Experimental Evolution, Cold Spring Harbor, Long Island, New York.

Botanical Society of America, General Section.

B. M. DAVIS, University of Michigan, Ann Arbor, Michigan.

*R. A. HARPER, Columbia University, New York City.

Botanical Society of America, Physiology Section.

B. M. DUGGAR, Missouri Botanical Garden, St. Louis, Missouri.

W. J. V. OSTERHOUT, Harvard University, Cambridge, Massachusetts.

Botanical Society of America, Systematic Section.

J. H. BARNHART, New York Botanical Garden, Bronx Park, New York City.

A. S. HITCHCOCK, U. S. Bureau of Plant Industry, Washington, D. C.

American Society of Naturalists.

J. A. HARRIS, Station for Experimental Evolution, Cold Spring Harbor, Long Island, New York.

E. M. EAST, Harvard University, Bussey Institution, Forest Hills, Boston, Massachusetts.

Ecological Society of America.

FOREST SHREVE, Desert Laboratory, Carnegie Institution, Tucson, Arizona.

*GEO. H. NICHOLS, Yale University, New Haven, Connecticut.

Paleontological Society of America.

E. W. BERRY, Johns Hopkins University, Baltimore, Maryland.

F. H. KNOWLTON, U. S. National Museum, Washington, D. C.

American Society of Agronomy.

C. A. MOOERS, University of Tennessee, Knoxville, Tennessee.

E. G. MONTGOMERY, Cornell University, Ithaca, New York.

Society for Horticultural Science.

*E. J. KRAUS, University of Wisconsin, Madison, Wisconsin.

W. A. McCUE, Delaware Agricultural Experiment Station, Newark, Delaware.

American Phytopathological Society.

*DONALD REDDICK (*Chairman of the Board*), Cornell University, Ithaca, New York.

C. L. SHEAR, U. S. Bureau of Plant Industry, Washington, D. C.

Society of American Foresters.

J. S. ILLICK, State Forest Academy, Mount Alto, Pennsylvania.

BARRINGTON MOORE, American Museum of Natural History, New York City.

American Conference of Pharmaceutical Faculties.

HENRY KRAEMER, University of Michigan, Ann Arbor, Michigan.

WORTLEY F. RUDD, Medical College, Richmond, Virginia.

Royal Society of Canada.

No elections.

At large.

W. A. ORTON, U. S. Bureau of Plant Industry, Washington, D. C.

WILLIAMS & WILKINS COMPANY

BALTIMORE, U. S. A.

Entered as second-class matter, November 9, 1918, at the post office at Baltimore, Maryland, under the Act of March 3, 1879

Copyright 1921, Williams & Wilkins Company

Price, net postpaid, per volume: { \$3.00 United States, Mexico, Cuba
\$3.12 Canada
\$3.25 Other countries

CONTENTS

Agronomy.....	1-63
Bibliography, Biography and History.....	64-76
Botanical Education.....	77-99
Forest Botany and Forestry.....	100-156
Genetics.....	157-249
Horticulture.....	250-315
Morphology, Anatomy and Histology of Vascular Plants.....	316-337
Morphology and Taxonomy of Bryophytes.....	338-354
Morphology and Taxonomy of Fungi, Lichens, Bacteria and Myxomycetes.....	355-377
Paleobotany and Evolutionary History.....	378-395
Physiology.....	396-446
Soil Science.....	447-480
Taxonomy of Vascular Plants.....	481-551
Miscellaneous, Unclassified Publications.....	552-565

BOARD OF EDITORS FOR 1920 AND ASSISTANT EDITORS

Editor-in-Chief, BURTON E. LIVINGSTON
The Johns Hopkins University, Baltimore

Associate, LON A. HAWKINS
U. S. Bureau of Plant Industry, Washington, D. C.

EDITORS FOR SECTIONS

Agronomy. C. V. PIPER, U. S. Bureau of Plant Industry, Washington, D. C.—Assistant Editor, MARY R. BURR, U. S. Bureau of Plant Industry, Washington, D. C.
Bibliography, Biography and History. LINCOLN W. RIDDLE, Harvard University, Cambridge, Massachusetts.
Botanical Education. C. STUART GAGER, Brooklyn Botanic Garden, Brooklyn, New York.—Assistant Editor, ALFRED GUNDERSEN, Brooklyn Botanic Garden, Brooklyn, New York.
Cytology. GILBERT M. SMITH, University of Wisconsin, Madison, Wisconsin.—Assistant Editor, GEO. S. BRYAN, University of Wisconsin, Madison, Wisconsin.
Ecology and Plant Geography. H. C. COWLES, The University of Chicago, Chicago, Illinois.—Assistant Editor, GEO. D. FULLER, The University of Chicago, Chicago, Illinois.
Forest Botany and Forestry. RAPHAEL ZON, U. S. Forest Service, Washington, D. C.—Assistant Editor, J. V. HOFMANN, U. S. Forest Service, Wind River Experiment Station, Stabler, Washington.
Genetics. GEORGE H. SHULL, Princeton University, Princeton, New Jersey.—Assistant Editor, J. P. KELLY, Pennsylvania State College, State College, Pennsylvania.
Horticulture. J. H. GOURLEY, West Virginia University, Morgantown, West Virginia.—Assistant Editor, H. E. KNOWLTON, West Virginia University, Morgantown, West Virginia.
Miscellaneous, Unclassified Publications. BURTON E. LIVINGSTON, The Johns Hopkins University, Baltimore, Maryland.

Morphology, Anatomy and Histology of Vascular Plants. E. W. SINNOTT, Connecticut Agricultural College, Storrs, Connecticut.
Morphology and Taxonomy of Algae. E. N. TRANSEAU, Ohio State University, Columbus, Ohio.
Morphology and Taxonomy of Bryophytes. ALEXANDER W. EVANS, Yale University, New Haven, Connecticut.
Morphology and Taxonomy of Fungi, Lichens, Bacteria and Myxomycetes. H. M. FITZPATRICK, Cornell University, Ithaca, New York.
Paleobotany and Evolutionary History. EDWARD W. BERRY, The Johns Hopkins University, Baltimore, Maryland.
Pathology. G. H. COONS, Michigan Agricultural College, East Lansing, Michigan.—Assistant Editor, C. W. BENNETT, Michigan Agricultural College, East Lansing, Michigan.
Pharmaceutical Botany and Pharmacognosy. HEBER W. YOUNGKES, Philadelphia College of Pharmacy and Science, Philadelphia, Pennsylvania.—Assistant Editor, E. N. GATHERCOAL, University of Illinois, Urbana, Illinois.
Physiology. B. M. DUGGAR, Missouri Botanical Garden, St. Louis, Missouri.—Assistant Editor, CARROLL W. DODGE, Brown University, Providence, Rhode Island.
Soil Science. J. J. SKINNER, U. S. Bureau of Plant Industry, Washington, D. C.—Assistant Editor, F. M. SCHERTZ, U. S. Bureau of Plant Industry, Washington, D. C.
Taxonomy of Vascular Plants. J. M. GREENMAN, Missouri Botanical Garden, St. Louis, Missouri.—Assistant Editor, E. B. PAYSON, Missouri Botanical Garden, St. Louis, Missouri.

BIBLIOGRAPHY COMMITTEE FOR 1920

J. R. SCHRAMM, *Chairman*, Cornell University, Ithaca, New York

H. O. BUCKMAN	L. KNUDSON
W. H. CHANDLER	E. G. MONTGOMERY
A. J. EAMES	D. REDDICK
R. A. EMERSON	L. W. SHARP
H. M. FITZPATRICK	K. M. WIEGAND
R. HOSMER	

BOTANICAL ABSTRACTS

A monthly serial furnishing abstracts and citations of publications in the international field of botany in its broadest sense.

UNDER THE DIRECTION OF

THE BOARD OF CONTROL OF BOTANICAL ABSTRACTS, INC.

BURTON E. LIVINGSTON, Editor-in-Chief
The Johns Hopkins University, Baltimore, Maryland

Vol. VII

FEBRUARY, 1921

No. 1

ENTRIES 1-565

AGRONOMY

C. V. PIPER, *Editor*

MARY R. BURR, *Assistant Editor*

1. ANONYMOUS. Planteavlén i 1919. [Plant production in 1919.] Tidsskr. Landokonomi (Kjöbenhavn) 1920: 284-298. 1920.—During the last two years of the world war and the first year following the war, the shortage of grass seed and red clover seed was acute, resulting in a greatly decreased acreage of grass and clover during 1919. The opinion is ventured that the decrease is temporary, since heavy importation of seed was received from the United States during the spring of 1920. As compared with pre-war planting, the 1919 acreage of wheat was decreased; rye was about the same; barley was increased slightly; sugar beets were increased about 20 per cent; potatoes about 35 per cent; and the area planted to vegetables was considerably increased. The harvest of 1919 is described; it is stated to have averaged about 107 per cent of normal.—*Albert A. Hansen.*

2. ANONYMOUS. Cultivation of main crop potatoes. Jour. Dept. Agric. Ireland 20: 217-227. 1920.

3. ANONYMOUS. Field experiments, 1919. Jour. Dept. Agric. Ireland 20: 167-174. 1920.—Summarizes results of variety tests made in Ireland with barley, mangels, oats, potatoes, turnips, and wheat.—*Donald Folsom.*

4. ANONYMOUS. Notes. Nature 105: 80-81. 1920.—Note on organization of British Empire Sugar Research Association to further the development of the industry.—*O. A. Stevens.*

5. ANONYMOUS. American books on agriculture. [Rev. of: GEHRS, JOHN H. Productive agriculture. xii + 426 p. Macmillan & Co.: London, 1917.] Nature 104: 495-496. 1920.—A textbook for "school children of the upper classes who propose to take up farming as the business of their lives."—*O. A. Stevens.*

6. ANONYMOUS. Sulphur as a fertilizer for wheat. Agric. Gaz. New South Wales 31: 462. 1920.—Results of 4 years' trials at Cowra gave negative results.—*L. R. Waldron.*

7. ANONYMOUS. Applied plant morphology. [Rev. of: BARBER, C. A. Studies in Indian sugar canes. Mem. Dept. Agric. India Bot. Ser. 10: 39-153. 1919.] Nature 104: 578. 1920.—A study of the underground branching of the plant of wild and cultivated forms of sugar cane and an attempt to correlate morphological characters with economic values. This is referred to as the fourth paper on the Indian sugar canes.—*O. A. Stevens.*

8. ANONYMOUS. (REICHS AUSSCHUSS FÜR ÖLE UND FETTE.) Zur Frage des Anbaues und der Akklimatisierung der Soja in Deutschland. [Concerning the cultivation and the acclimatization of the soy bean in Germany.] Naturwiss. Zeitschr. Forst- u. Landw. 18:36-38. 1920.—The bureau of fats and oils in its search for new fats and oils since the war made a thorough study of the advisability of introducing the soy bean on a large scale, but has reached the conclusion that regardless of its longer vegetative period, it does not approach in yield the common dwarf bean (*Phaseolus nanus*). Late ripening crops of the soy bean developed very little or no seed at all. There is little hope that further experimentation in cultivating and breeding will result in producing a soy bean ripening early enough and producing large enough yields to make its planting in the most favorable parts of Germany a success.—J. Roeser.

9. ANONYMOUS. Cane experiment in St. Croix. Agric. News [Barbados] 19: 180, 181, 196. 1920.—A review of the work done with sugar cane at the Slob Experimental Station during 1919-20, as reported by EDUARD GEDDE, manager. Results of experiments show that it is advantageous to plant canes equal distances apart in both directions. Cane planting experiments with cuttings obtained from plant, first, and second ratoon canes, gave results in favour of those taken from first ratoons, since these gave 4 tons more per acre than those from plant canes and 11½ tons more than those from second ratoons. Carefully conducted comparative experiments with planting cane in flat and banked plats gave results in favor of the former from the points of view of yield and of cultivation costs.—J. S. Dash.

10. ANONYMOUS. Agriculture and industries in the Turks and Caicos Islands. Agric. News [Barbados] 19: 3. 1920.—This is a review of G. W. SMITH's 1918 report as Commissioner for the Turks and Caicos Islands. Mention is made of the introduction into the colony of seeds of both Sea Island and Upland strains of cotton which were brought by settlers from the United States who were granted lands there by the British Government after the American War of Independence. Never cultivated, plants from these seeds were allowed to grow at will in waste places near the settlements "Where amid cactus shrub they pursued for over a century a struggle for existence, evolving eventually a type of cotton plant that for hardiness, freedom from disease and heavy cropping qualities, under almost unbelievable conditions of sterility and neglect, cannot, it is believed, be surpassed anywhere."—J. S. Dash.

11. ANONYMOUS. Seedling canes experimented with in Antigua in 1919. Agric. News [Barbados] 19: 7. 1920.—In this review of a report on sugar cane presented to the Agricultural and Commercial Society by A. E. COLLENS, it is stated that the White Transparent is the variety most cultivated. As plant cane, its calculated yield for 1919 was 15.45 tons of cane per acre; and as ratoons, 12.06 tons. The calculated sucrose content was 2.11 pounds, and 1.99 pounds per gallon of juice, respectively. In the experiments, B. 6308 came first as plant cane with an average of 23.4 tons of cane per acre and 2.08 pounds sucrose per gallon. The best ratooning cane was found to be B. 10650.—J. S. Dash.

12. ATKINSON, ESMOND. Weeds and their identification. New Zealand Jour. Agric. 20: 168-171. 1 pl. 1920.—This article deals with perennial Sow Thistle (*Sonchus arvensis*). The plant and its habits are described. It has been in New Zealand for many years. It need not be considered serious in pastures, as sheep eat it readily. In cultivated land the weed may be eradicated by the use of a smothering crop, such as oats and tares, or Wearora vetchling; or the land may be put into grass for a couple of years.—N. J. Giddings.

13. BREAKWELL, E. Improvement of sweet sorghums. Agric. Gaz. New South Wales 31: 549-551. 1920.—See Bot. Absts. 7, Entry 168.

14. BREAKWELL, E. Popular description of grasses. Agric. Gaz. New South Wales 31: 507-512. 2 fig. 1920.—Deals with the introduced Chloris grasses and describes in some detail the agronomic relations of Rhodes grass (*Chloris gayana*). The annual *C. virgata* is not considered of much economic importance.—L. R. Waldron.

15. BROWN, ERNEST B. **Relative yields from broken and entire kernels of seed corn.** Jour. Amer. Soc. Agron. 12: 196-197. 1920.—A lower percentage of the broken seed germinated, and the seedlings were weaker than those produced by whole kernels. In weight of ear and yield per plant the broken seed produced consistently less than did the entire seed. The broken seed produced 7.6 bushels less per acre than did the entire seed.—*F. M. Schertz.*

16. BRUCE, J. L. **Rotation of crops.** New Zealand Jour. Agric. 20: 94-96. 1920.—A 6-year rotation for dairy farms is suggested. This included 3 years in grass; 1 year in roots; 1 year in flax, barley, beans, potatoes, linseed, etc.; and 1 year in oats and tares.—*N. J. Giddings.*

17. C., C. **The roast beef of old England.** [Rev. of: MACKENZIE, R. J. J. *Cattle and the future of beef production in England.* With a preface and chapter by F. H. R. Marshall. xi + 168 p. University Press. Cambridge, 1919]. Nature 105: 62-63. 1920.—Author considers a supply of prime beef necessary to a sound system of agriculture. The increase of plow-land at expense of grass-land during the war is now in process of reversal, and this may proceed at an increasing rate unless there is evidence of greater profit in crops other than grass.—*O. A. Stevens.*

18. CALVINO, MARIO. **Estudio sobre el cultivo de la soya en Cuba.** (A study regarding the cultivation of the soy bean in Cuba.) Rev. Agric. Com. y Trab. [Cuba] 3: 124-131. 9 fig. 1920.—Trials of 13 varieties of soy beans (*Soja max* L.) are described with reference to germination, time of emergence, length of growing season, yield and nutritive value.—*F. M. Blodgett.*

19. COCKAYNE, L. **An economic investigation of the montane tussock—grassland of New Zealand.** New Zealand Jour. Agric. 20: 82-94. 11 fig. 1920.—Several depleted areas which have been protected by rabbit-proof fences are showing great improvement. A reasonable amount of pasturing apparently does not interfere with the regeneration. Valuable forage grasses spread from the tussocks, and many seedling plants soon develop. The plants found in these areas are listed.—*N. J. Giddings.*

20. COLWELL, W. R. **Under irrigation with bore water.** Agric. Gaz. New South Wales 31: 476-477. 2 fig. 1920.—Excellent returns were obtained from Sudan grass at the Coonamble Experiment Farm with the assistance of irrigation from bore water.—*L. R. Waldron.*

21. DOWNING, R. G. **Sugar-beet growing in Victoria.** Agric. Gaz. New South Wales 31: 463-465. 1920.—Summary of results showing profits made by farmers and how sugar-beet production is related to other phases of crop production.—*L. R. Waldron.*

22. FABER, HARALD. Foreword by SIR ROBERT GREIG. **Forage crops in Denmark.** ix + 100 p. Longmans, Green and Co.: London, 1920.—This volume, written in English, describes the progress that has been made in recent years in the improvement and culture of forage crops and the development of the trade in guaranteed seeds in Denmark. The book is of unusual interest to all engaged in the development and utilization of improved crops and in the betterment of the seed trade. One-half of the work is devoted to root crops. Following the investigations of Fjord published in 1890, which showed that the dry matter in roots was equal in feeding value to grain for cows and swine, the acreage of root crops in Denmark has been increased sevenfold; namely, from 95,000 acres in 1888 to 678,000 acres in 1919. Before this time breeding of improved root crops had made considerable progress, the initiative being due both to progressive farmers and to enterprising seed firms, who later formed the "Society for the Production of Home-Grown Seed." The success achieved in developing and establishing improved strains of root crops has been remarkable, and since 1894 has been assisted by the government. The methods employed are described in detail.—The improvement of grasses in Denmark began with the work of P. NIELSEN in 1869. He introduced the system of testing grasses in small duplicate plats instead of in large fields,

and in 1896 became the first director of the state experimental farm at Tystofte. With this work began the systematic testing of grass seeds of different strains and from various countries, and the development of special seed farms was a subsequent outgrowth of this movement. Later a system was introduced of making comparative trials of lots of grass and clover seed submitted by growers and dealers. This has stimulated the selection of special high-yielding strains, especially of grasses and of white clover, of which the Mors strain is best. In the trials, samples of orchard grass (cocksfoot), Italian rye-grass, meadow fescue, tall oat-grass, timothy, red clover, white clover, and bird's-foot trefoil were tested. So far as reported, the native Danish strains were in every case the best.—The last chapter is devoted to the development of trade in guaranteed seeds. This again was initiated by farmers and seedsmen, but later its control was taken over by the government. The success of the whole movement is indicated not only by the much increased acreage of high-yielding forage crops, but also by the fact that Denmark now exports much seed, while formerly it was a large importer.—*C. V. Piper.*

23. FEDERAL HORTICULTURAL BOARD, U. S. DEPT. AGRIC. [Restrictive legislation and notices of quarantines in U. S. A.] Service and Regulatory Announcements 68: 52-111. 1920.

24. FISHER, M. L. The dormant period of timothy seed after harvesting. Proc. Indiana Acad. Sci. 1918: 276-279. 1920.—Reports in 2 tables results of timothy seed germination. After 25 days the germinating percentage of seeds from individual heads averaged 98.2 per cent while in mass selections it was 88 per cent. Three or 4 weeks after harvesting, timothy seed has reached its maximum germinating power.—*F. A. Anderson.*

25. FURBY, E. Wheat experiments for hay. Yanco experiment farm, 1919. Agric. Gaz. New South Wales 31: 467-471. 1920.—Several standard varieties of wheat were used. Early sowing gave best results.—*L. R. Waldron.*

26. GASSER, G. W. Report of the work at Rampart station. Rept. Alaska Agric. Exp. Sta. 1917: 34-57. Pl. 3-4. 1919.—Reports on the behavior of alfalfa (*Medicago falcata* and *M. sativa*), bird vetch (*Vicia cracca*), field peas, chick pea (*Cicer arietinum*), clover (*Trifolium pratense* and *T. lupinaster*), winter and spring wheat, winter and spring rye, barley, oats, buckwheat, hemp, millet, flax, and potatoes. Nearly all the winter wheat was killed by freezing, but rye was not. Spring rye matured too late. Barley, oats, and most varieties of spring wheat matured well. This station is devoted chiefly to grain breeding, and a large proportion of the varieties grown originated here. Two fruits—the first grown in the interior of Alaska—were produced on a Siberian Crab tree. Strawberries of varieties bred at Sitka have survived several winters and have fruited abundantly. Reports are also given on garden vegetables and annual flowering plants.—*J. P. Anderson.*

27. GEORGESON, C. C. Reports from seed and plant distribution. Rept. Alaska Agric. Exp. Sta. 1917: 86-90. 1919.—See Bot. Absts. 7, Entry 269.

28. GEORGESON, C. C. Summary of the work at the several stations. Rept. Alaska Agric. Exp. Sta. 1917: 5-33. 2 pl. 1919.—See Bot. Absts. 7, Entry 270.

29. GÉROME, J. Essais de culture de Pommes de terre avec des tubercules appauvris ou anormaux (1919). [An experiment in growing potatoes from depauperate or abnormal tubers.] Bull. Mus. Hist. Nat. [Paris] 25: 677-681. 1919.—Results of this experiment in the vicinity of Paris with 9 varieties are given in tabular form. "Early rose" proved most satisfactory, and "Up to date" and "Prime bretonne" gave encouraging results.—*E. B. Payson.*

30. HAMBLIN, C. O. To infect lucerne seed with nodule organism. Agric. Gaz. New South Wales 31: 466. 1920.—Recommends using soil from an old lucerne (alfalfa) field, allowing the soil to dry well in the shade. The author states that the bacteria from artificial (laboratory) cultures are weaker than those produced under natural conditions.—*L. R. Waldron.*

31. HANLY, JOSEPH. Some notes on crop rotations. Jour. Dept. Agric. Ireland 20: 184-189. 1920.—Discusses crop rotation in regard to its historical development, its advantages, and the types practiced in Ireland.—*Donald Folsom.*

32. HARLAN, HARRY V. Smooth-awned barleys. Jour. Amer. Soc. Agron. 12: 205-208. 1920.—A report on the introduction of smooth-awned barley and the progress that has been made. It is predicted that a high-yielding smooth-awned barley will be developed.—*F. M. Schertz.*

33. HARSHBERGER, JOHN W. Text-book of pastoral and agricultural botany for the study of the injurious and useful plants of country and farm. ix + 294 p., 1 pl., 120 fig. P. Blakiston's Sons and Co.: Philadelphia, 1920.—This book is based on a course in botany given to veterinary students in the University of Pennsylvania. Nine chapters are devoted to poisoning by plants, one to feeds and feeding, three to grasses, three to legumes, one to weeds, and one to agricultural seeds.—*C. V. Piper.*

34. MAIDEN, J. H. Chats about the prickly pear. No. 5. Agric. Gaz. New South Wales 31: 557-562. 1920.—Mainly extracts from well-known bulletins by two American authors, HARE and GRIFFITHS, on value and methods relative to *Opuntia* spp. as feed for live stock.—*L. R. Waldron.*

35. MAUGHAN, HOWARD J. Factors affecting the depth of planting various crops. (Abstract.) Utah Acad. Sci. 1: 206-207. 1918.

36. McCAULEY, C. Sudan grass in western districts. At Cowra experiment farm. Agric. Gaz. New South Wales 31: 473-475. 1920.—Detailed financial statement is given of results from 20 acres of this grass, showing it to have been very profitable. An analysis of Sudan-grass silage is given.—*L. R. Waldron.*

37. MOOMAW, LEROY. Report for the Dickinson substation for 1919. North Dakota Agric. Exp. Sta. Bull. 138. 24 p., 6 fig. 1920.—Weather data relative to temperature, precipitation, wind velocity, and length of growing season are presented, as well as annual and average yields of different varieties of various crops. In an excessively dry season following two dry seasons Russian thistle (*Salsola kali tragus*) produced 5.7 tons per acre of air-dry material (hay).—*L. R. Waldron.*

38. MOORE, C. C. Technic of potato starch manufacture. Potato Mag. 2¹²: 10, 11, 20, 22-23; 3¹: 8, 9, 20, 22-23. 1920.

39. MOREILLON, M. Influence de l'ombrage sur la valeur des gazons dans les pâturages boisés. [The influence of shade upon the value of the grasses in wooded pastures.] Jour. Forest. Suisse 70: 131-142. 1919.—A discussion of Swiss alpine meadows at altitudes from 1100 to 1650 meters. As a result of the shade of trees in these alpine pastures, there is not only a reduction in the percentage of good forage plants but also in the quantity of fodder harvested. Under spruce the loss in dry fodder is 88 per cent by weight and under larch at the same station from 30 to 45 per cent of that in open ground. The shade is also injurious to the qualitative value of the fodder. In Zürich and Grisons the following figures were obtained.

Weights represent kilograms per are; i.e., $\frac{1}{100}$ acre

PARCELLE	PROTEIN	FAT	SOLUBLE SUBSTANCES, NON- NITROGENOUS	TOTAL
Open.....	4.55	1.43	15.24	21.22
Shaded.....	3.67	1.05	10.55	15.27

In a pasture with spruce trees 20 meters apart the forage will lose 60 per cent in weight and 30 per cent in quality; its end value is therefore but 20 per cent of the end value of forage grown in full sunlight. In conclusion, specific recommendations are presented for improving the management and administration of Swiss alpine pastures.—C. J. Kraebel.

40. MURRAY, J. ALAN. The classification of cattle foods. [Abstract.] Rept. British Assoc. Adv. Sci. 1919: 383. 1920.

41. OLDERSHAW, A. W. The value of lupines in the cultivation of poor light land. [Abstract.] Rept. British Assoc. Adv. Sci. 1919: 380-381. 1920.

42. PITT, J. M. Farmers' experiment plots. 1919-20. Central Coast. Agric. Gaz. New South Wales 31: 539-547. 1920.—Experiments included variety trials, fertilizer trials, and size of seed piece, depth and rate of planting.—L. R. Waldron.

43. PORTER, W. R. Thirteenth and fourteenth annual report of the state demonstration farms 1918 and 1919. North Dakota Agric. Exp. Sta. Bull. 135. 84 p., 1 fig. 1920.—Detailed results are given from 22 farms, including cost of production; a summary of results for 10 years is presented for 9 of the farms. Wheat has yielded 16.9 bushels per acre for 14 years, which is 54 per cent higher than the state average for the same period.—L. R. Waldron.

44. PRATT, HIRAM E. Report of work at Kodiak live stock and breeding station. Rept. Alaska Agric. Exp. Sta. 1917: 72-81. 1919.—Reports on field and forage crops grown at the station. Twelve varieties of potato were tested. The following native plants were used for silage, beach rye (*Elymus mollis*), beach sedge (*Carex cryptocarpa*), bluetop (*Calamagrostis langsdorffi*), and fireweed (*Epilobium angustifolium*). These do not stand continual cutting well, but the yield is maintained if cutting is done only in alternate years. Native bluetop is the chief hay grass; but coarse bluegrass (*Poa glumaris*), Kentucky bluegrass (*Poa pratensis*), and wild barley (*Hordeum boreale*) occur mixed with bluetop, and make good hay. Analyses of *Calamagrostis langsdorffi*, *Carex cryptocarpa*, and *Elymus mollis* are given and compared with such standard grasses as *Poa pratensis*, *Agrostis alba*, and *Phleum pratense*.—J. P. Anderson.

45. PRIDHAM, J. T. The selection of promising wheat plants. Agric. Gaz. New South Wales 31: 548. 1920.—See Bot. Absts. 7, Entry 234.

46. RAMSAY, A. A. Sorghum as a possible source of industrial alcohol. Agric. Gaz. New South Wales 31: 479-484. 1920.—Experiments were conducted at Hawkesbury Agricultural College with different varieties of sorghum. Results are given in detail of the field data, percentage of juice expressed, its analysis, amount of alcohol produced, and composition of megass. It was found for most varieties that the market value of the alcohol obtained would not pay for the cost of cutting and transporting the cane to the factory. Even with the best variety the margin was only about 1s. per ton. Production of alcohol in this manner can not be considered a feasible undertaking.—L. R. Waldron.

47. REED, GEORGE M. Varietal resistance and susceptibility of oats to powdery mildew, crown rust, and smuts. Missouri Agric. Exp. Sta. Res. Bull. 37. 3-41. 1920.

48. ROBERTS, GEORGE, AND A. E. EWAN. I. Report on soil experiment fields. II. Maintenance of fertility. Kentucky Agric. Exp. Sta. Bull. 228: 89-131. 1920.—See Bot. Absts. 7, Entry 463.

49. ROUND, LESTER A. Experiments with potato silage. Potato Mag. 33: 6-7, 29-31. 2 fig. 1920.

50. SHEPHERD, A. N. Summer green fodder trials. Murrumbidgee irrigation area, 1919-1920. Agric. Gaz. New South Wales 31: 554-556. 1920.—General cultural notes for sorghum and maize grown for summer green fodder, and the yields obtained at the various places of experimentation. The heaviest yield was 25.5 tons per acre with *Sorghum saccharatum* following lucerne.—L. R. Waldron.

51. SNODGRASS, M. D. Report of the work at Fairbanks station. Rept. Alaska Agric. Exp. Sta. 1917: 57-72. Pl. 5-7. 1919.—Ninety-five acres were cropped with small grain and five acres with root crops. Nearly all the winter grain was killed by freezing. Owing to drought in May and first half of June, spring grains yielded only half as much as usual. This drought also caused uneven germination and consequent uneven ripening. Three varieties of spring wheat, 2 of oats, and 2 of barley were grown under field conditions, and larger numbers were grown in small plots or in head-to-row tests. A spring wheat originally received from Irkutsk, Siberia, in 1914, and known as H. G., is considered the best wheat for the region. Grown under different rotations and exposures, it showed considerable differences in yield. Japanese buckwheat was successfully grown. Reports are given on the behavior of field peas, alfalfa, and clover. Red clover winter kills, but grew 24-30 inches high by September 7 from spring seeding. Grains are grown for hay. *Calamagrostis langsdorffi* produces the native hay. The potato is the chief money crop of the region. Results of the tests at the station are given. Some potato blight and a very little scab were present. Petrowski turnip is another important crop of this region, and seed is grown and distributed by the station. Notes are given on garden vegetables and on flowers; also on strawberries, red raspberries, and native berries. Twenty-five requests for seed were filled.—J. P. Anderson.

52. SNODGRASS, M. D. Cooperative work. Rept. Alaska Agric. Exp. Sta. 1917: 84-86. 1919.—Gives report of cooperative work among the farmers of the Matanuska valley and the Anchorage-Knik region in southern Alaska.—J. P. Anderson.

53. SOMERVILLE, W. [Presidential address.] Grass. Rept. British Assoc. Adv. Sci. 1919: 364-379. 1920.—From the experiments which have been carried out, the following conclusions may be drawn: "(1) That the quality of a pasture is not primarily dependent on its botanical composition, though, as a rule, the presence of white clover, and other Leguminosae is indicative of high feeding value. (2) That poor pastures, especially on clay soil, can be rapidly and profitably improved by the use of phosphates, especially basic slag. (3) That, as a rule, phosphates alone are sufficient to effect and maintain the improvement, and that, of supplementary substances, potash and lime are occasionally worthy of attention. (4) That the improvement of poor pasture is very dependent on the presence of Leguminosae, and especially of white clover. (5) That renovating with the seed of wild white clover may, in the absence of natural Leguminosae, be a necessary preliminary or concurrent operation. (6) That cake can rarely be used at a profit, and that, as an agent in improving poor pasture, it occupies an unsatisfactory position. (7) That nitrogen, whether in the form of artificial manure, or as cake residues, when added to phosphates for pasture, is always unnecessary and frequently detrimental. (8) That, in the case of hay on permanent grass land, equal weights of produce may have very different feeding values. (9) That few forms of agricultural expenditure are more certain in their results than the judicious use of manures on grass land, and that the meat and milk producing capacity of the country can be largely and rapidly increased, with great pecuniary gain to the farmer, and still greater economic advantage to the nation."—C. L. Wilson.

54. SYME, J. E. The grain wheats for central western districts. Farmers' experiment plots, 1909-1919, summarized. Agric. Gaz. New South Wales 31: 533-538. 1920.—"Federation," "Marshall No. 3," "Cranberra" and "Hard Federation" did best.—L. R. Waldron.

55. SYME, J. E. In a dry season at Parkes. Agric. Gaz. New South Wales 31: 477-478. 1920.—Discusses Sudan grass and considers it valuable.—L. R. Waldron.

56. TRUAX, H. E. United States grades for potatoes. *Potato Mag.* 31: 15. 1920.

57. WATTS, GEORGE. Cotton growing in the British Empire. *Nature* 104: 694-696. 1920.—British mills are said to be adapted to use of American long-staple cottons and unable to use the shorter staples of India and other countries. Definite organization of a research institution is needed. The following suggestions were made: To establish in Manchester a college of cotton where experts and planters can be trained; to promote intensive study of races of all species of *Gossypium*, with careful records of all plantings; to establish branch colleges in the more important centers of cultivation to complete training for local conditions; to replace cultivation by natives on a small scale with plantations directed by trained people. Success of American cotton is attributed to the fact that the work was undertaken by intelligent farmers who evolved new and superior stocks and who did not have to contend with vested interests of native cultivators.—O. A. Stevens.

58. WENHOLZ, H. Papago: A new variety of sweet corn. *Agric. Gaz. New South Wales* 31: 552-553. 1 fig. 1920.—Seed was secured from Arizona. The variety is said to be remarkable because of the resistance of its pollen to dry heat. It is very late, of fair quality, and promising for Australian conditions.—L. R. Waldron.

59. WENHOLZ, H. Sweet corn. Variety trial, 1919-1920. *Agric. Gaz. New South Wales* 31: 585-589. 1920.—Fourteen varieties were tested, the seed coming from America. They averaged in yield 487 dozen ears per acre. The best yielding was Mammoth White Cory with 850 dozen ears, weighing 5.5 tons. Varieties are described and recommendations made.—L. R. Waldron.

60. WENHOLZ, H. Soil improvement for maize. I. Manures and fertilizers. *Agric. Gaz. New South Wales* 31: 495-501. 1920.—A report of results secured from the application of commercial fertilizers, especially phosphorus, upon maize for grain and fodder in various districts of the province. Trials were made upon farmers' experiment plats. Usually the application of the phosphorus in the shape of superphosphate showed a profit.—L. R. Waldron.

61. WENHOLZ, H. Pop-corn variety trial, 1919-1920. *Agric. Gaz. New South Wales* 31: 562. 1920.—An average yield of 40 bushels per acre is recorded.—L. R. Waldron.

62. WHEELER, H. J. Delayed application of fertilizer. *Potato Mag.* 21²: 5, 38. 1 fig. 1920.—Late application of fertilizer increased yield of potatoes in Wisconsin over that of unfertilized fields.—Donald Folsom.

63. ZIELSTORFF, W. Einsäuerungsversuch im Deutschen Futterturm mit anschliessendem Fütterungsversuch. (Ensiling experiment in German silo with connected feeding experiment.) *Mitteil. Deutsch. Landw. Gesell.* 35: 563-565. 1920.—A comprehensive series of experiments have been planned to determine the value of different methods of ensiling. The German farmer is chiefly interested in the ensiling of grass and clover in order to save this feed when weather conditions render it impossible to make hay. One experiment made under such conditions is described. Timothy that had already become quite old because the weather did not permit of cutting was ensiled. Feeding experiments with the ensilage produced showed that 100 kgm. of the ensilage had the same feeding value for milk cows as 170 kgm. of mangels.—A. J. Pieters.

BIBLIOGRAPHY, BIOGRAPHY AND HISTORY

NEIL E. STEVENS, *Editor*

64. ANONYMOUS. Dansk Landbolovgivning efter 1849. [Danish farm laws since 1849.] *Tidsskr. Landokonomi* (Kjöbenhavn) 1920⁷: 265-283. 1920.—A discussion of the agricultural laws passed by the Danish legislature since 1849. Particular attention is paid to the good and bad effects which these laws have had upon the farmers.—Albert A. Hansen.

65. ANONYMOUS. The New Zealand science congress, 1919. *Nature* 104: 516-518. 1920. A review of some papers, including presidential address of L. COCKAYNE, being an historical account of the institute. Notes that 654 papers on botany have been published in the first 50 volumes of transactions of the institute.—O. A. Stevens.

66. ANONYMOUS. Publications of the staff, scholars and students of The New York Botanical Garden during the year 1919. *Jour. New York Bot. Gard.* 21: 65-72. 1920.

67. C., N. R. Scientific biography. [Rev. of: BOWER, F. O. Joseph Dalton Hooker. 62 p. Macmillan and Co.: London, 1919.] *Nature* 104: 562. 1920.—"Scholarly but not interesting."—O. A. Stevens.

68. EBERHARD, JULIUS. Die Technik der Naturverjüngung einst und jetzt. Ein forstgeschichtliche Studie. [The technique of natural reproduction formerly and now.] *Forstwiss. Centralbl.* 42: 161-183, 204-226. 1920.—See *Bot. Absts.* 7, Entry 116.

69. FREEMAN, W. G. The centenary of the Royal Botanic Garden, Trinidad. *Agric. News [Barbados]* 19: 36-37. 1920.—Sections of a paper originally contributed to the *Trinidad Guardian*, are reproduced. The Garden shares with those of Calcutta and Sydney the distinction of being the only ones in the British Colonial Empire which have reached 100 years or more of unbroken activity. Some account is given of the progress of the Garden under different Curators.—J. S. Dash.

70. GLEASON, H. A. Organization of the American iris society. *Jour. New York Bot. Gard.* 21: 39-40. 1920.—See *Bot. Absts.* 7, Entry 302.

71. LUISIER, A. o P. Fernando Theissen, S. J. *Broteria, Ser. Bot.*, 18: 73-78. 1920.—Father THEISSEN was killed early in September, 1919, by falling over a precipice while collecting alone near Feldkirch, Vorarlberg. He was born in Krefeld, Rhenish Prussia, July 27, 1877. A member of the Society of Jesus, he taught first in Brazil, later in several parts of central Europe. Father THEISSEN was a mycologist, contributing to many journals, especially the *Annales Mycologici*. *Thiessenula* Sydow and *Theissenia* Maublanc, were named in his honor.—A bibliography of 51 titles and notice of a posthumous work on the lichens of Vorarlberg is appended.—E. B. Chamberlain.

72. MORRIS, J. C. [Presidential address.] *Rept. British Assoc. Adv. Sci.* 1919: 316-331. 1920.—A review of recent British work in pure and applied botany, such as agronomy, pathology, and genetics. The application of pure botany to questions of economic importance is presented in the development of more valuable varieties of wheat, cotton, sugar cane, and rubber, and in improving the quality of the production of cacao, flax, and other crops. A reference is made to the prominent place which ecological studies will take in the future of botany. Recent work in tropical botany receives especial emphasis. The article is in general a summing-up of the great influence of botany upon the welfare of the human race.—A necrological review is presented.—C. L. Wilson.

73. P(RAIN), D. James William Helenus Trail. *Kew Bull. Misc. Inf.* [London] 1919: 378-388. 1919.—See also *Bot. Absts.* 6, Entry 955.

74. SMALL, J. K. Of grottoes and ancient dunes. *Jour. New York Bot. Gard.* 21: 25-38, 45-54. *Pl.* 241-244. 1920.

75. THÉRIOT, I. Vandalisme et solidarité scientifique. [Ruthlessness and scientific brotherhood.] *Rec. Publ. Soc. Havraise Études Diverses* 87: 131-135. 1920.—An account of the partial destruction and loss of the moss collections and drawings of JULES CARDOT of Charleville. Quotations from CARDOT's letters give an account of the state of his collection upon return to Charleville. The action of English and American bryologists in raising funds for the purchase of CARDOT's remaining herbarium on behalf of the Museum of Paris is described. [Cf. *Bot. Absts.* 5, Entry 2407.]—E. B. Chamberlain.

76. W., A. S. Robert Etheridge. *Nature* 104: 700-701. 1920.—Brief biography. Director of Australian Museum since 1895. Noted for work in palaeontology.—O. A. Stevens.

BOTANICAL EDUCATION

C. STUART GAGER, *Editor*ALFRED GUNDERSEN, *Assistant Editor*

77. ANONYMOUS. *Awbury Arboretum*. Brooklyn Bot. Gard. Rec. 9: 23-24. 1920.—Digest of article in Bull. Geog. Soc. Philadelphia (July, 1919). Awbury Arboretum comprises over 30 acres at Washington Lane Station, near Philadelphia. It has been endowed by CAROLINE E. POPE and other members of the POPE family as an arboretum and refuge for migratory birds.—C. S. Gager.

78. ANONYMOUS. *Botanical guides*. [Rev. of: COOK, M. T. *Applied economic botany: based upon actual agricultural and gardening projects*. xviii + 261 p. J. B. Lippincott Co.: Philadelphia and London, 1919. (Farm Life Text Series.) See also Bot. Absts. 3, Entries 491.] Nature 105: 34-35. 1920.—Title is misleading; book as a whole is disappointing.—O. A. Stevens.

79. ANONYMOUS. *Botanical guides*. [Rev. of: (1) SULMAN, A. E. *Some familiar wild flowers*. ii + 65 p. (2) *Australian wild flowers*. ii + 67 p. Angus and Robertson: Sydney (no dates). (3) SULMAN, FLORENCE. *A popular guide to the wild flowers of New South Wales*. Vol. 2, xxi + 249 p., 71 pl. Same publisher, 1919.] Nature 105: 35. 1920.

80. ANONYMOUS. *Museums and the state*. Nature 105: 68-70. 1920.—Communications from 5 persons in response to article of March 11.—O. A. Stevens.

81. ANONYMOUS. *The state and the national museums*. Nature 105: 29-31. 1920.—A survey of British museums and plans for their futures. Separate museums have arisen in response to conditions rather than by a broad and general plan. Coördination is needed to enable each to fill a distinct and useful place.—O. A. Stevens.

82. ANONYMOUS. *The value of Botanic Gardens*. Agric. News [Barbados] 19: 193, 194. 1920.—It is pointed out that the value of these institutions "for the advancement and diffusion of a knowledge and love of plants" has only recently been appreciated to any extent; and in small communities it has not yet been realised. The writer considers that a botanic garden contributes to the well-being of the people from the social, educational, and scientific points of view.—J. S. Dash.

83. ANONYMOUS. *Prospectus of courses offered by the Brooklyn Botanic Garden, 1920*. Brooklyn Bot. Gard. Rec. 9: 1-18. 1920.

84. ANONYMOUS. *Education and research chiefly in relation to sugar and rice*. Agric. News [Barbados] 19: 167, 182. 1920.—In the course of a visit to Havana and New Orleans, the Scientific Assistant to the Imperial Department of Agriculture for the West Indies, W. R. DUNLOP, made a number of observations, of which an account is here given. A description is given of the various sugar and rice experimental stations visited, and also certain of educational institutions devoted to agriculture.—J. S. Dash.

85. ANONYMOUS. *Fern study*. Nat. Study Rev. 16: 235-257. 1920.—A very elementary presentation of the principal facts about the structure, growth, and life-history of ferns, with simple key and descriptions.—W. L. Eikenberry.

86. BOYNTON, K. R. *Vocational education in gardening for disabled and convalescent soldiers and sailors*. Jour. New York Bot. Gard. 21: 87-94. 1920.

87. BROWN, J. G. *A new economic botany*. [Rev. of: COOK, MEL T. *Applied economic botany*. xviii + 261 p. J. B. Lippincott Co.: Philadelphia and London, 1919.] Plant World 22: 309-311. 1919.

88. COWELL, ARTHUR WESTCOTT. *Awbury Arboretum Address*. Bull. Geog. Soc. Philadelphia 17: 98-102. July, 1919.—Gives brief outline of planting plans, which include a rose garden and a rhododendron vale. "The system of naming is that which will be found of greatest advantage to average people and students and nursery men, and the names adopted by the Committee upon Standardized Plant Names have been used. These are the terms found in most botanies and in the Cyclopedia of Horticulture."—*C. S. Gager*.
89. ENGLER, A. *Bericht über den Botanischen Garten und das Botanische Museum zu Berlin-Dahlem*. vom 1. April 1918 bis zum 31. März 1919. [Report on the Botanical Garden and Botanical Museum at Berlin.] Notizbl. Bot. Gart. Berlin 7: 331-344. 1919.
90. ENGLER, A. *Bericht über den Botanischen Garten und das Botanische Museum zu Berlin-Dahlem*. vom 1. April 1919 bis zum 31. März 1920. [Report on the Botanical Garden and Botanical Museum at Berlin.] Notizbl. Bot. Gart. Berlin 7: 455-466. 1920.
91. G[AGER], C. S. *Prospects for a new national botanic garden*. Brooklyn Bot. Gard. Rec. 9: 20-22. Jan., 1920.
92. GARRETT, A. O. *The influence of biological investigations upon the other sciences*. Utah Acad. Sci. 1: 68-77. 1918.
93. HARSHBERGER, JOHN W. *Text-book of pastoral and agricultural botany for the study of the injurious and useful plants of country and farm*. ix + 294 p., 1 pl., 120 fig. P. Blakiston's Sons & Co.: Philadelphia, 1920.—See Bot. Absts. 7, Entry 33.
94. KARRAKER, P. E. *Notes on the conference on elementary soil teaching, held at Lexington, Kentucky, June, 1920*. Soil Sci. 10: 247. 1920.—The elementary work on soils should be a course of 5 semester hours credit given in the sophomore year. The minimum prerequisites should be one year of general inorganic chemistry, one term of general geology, and high school or college physics. At least three-fifths of the time should be spent in lecture or recitation, and a standard textbook should be used.—*W. J. Robbins*.
95. LANKESTER, E. RAY. *Museums and the state*. Nature 105: 100-101. 1920.—Favors separation of botany, zoology, etc. in distinct museums. The main purpose of a museum is the acquisition, preservation, and study of specimens of scientific value. Public exhibition is a secondary but important function. Materials for exhibition should be limited in amount but selected and displayed to the best possible advantage. The author would like to see the system used at the American Museum of Natural History in New York introduced (in British museums) but thinks it still gives too much space to public exhibition. Part of article and two others under same title (pp. 101-102) by J. Stanley Gardiner and W. M. Tattersall relate more particularly to organization and management.—*O. A. Stevens*.
96. MANGHAM, SYDNEY. *Method and substance of science teaching: The neglect of biological subjects in education*. [Abstract.] Rept. British Assoc. Adv. Sci. 1919: 336. 1920.
97. SNYDER, RAY P. *The school garden as a means of education*. Brooklyn Bot. Gard. Rec. 9: 91-100. July, 1920.
98. VICTORIAN. *Popular Science*. Nature 104: 630. 1920. The author agrees with review entitled Scientific Biography [See: BOWER on HOOKER. Nature 104: 562. 1920.]. He thinks real workers should give some time to popular articles, perhaps one lecture a year which could be published at a popular price.—*O. A. Stevens*.
99. WENTZ, JOHN B. *An outline of an undergraduate course in grain grading*. Jour. Amer. Soc. Agron. 12: 198-204. 1920.—An outline of the course as presented at Maryland State College. It includes grading of corn, wheat, and oats; laboratory practice; and apparatus used.—*F. M. Schertz*.

FOREST BOTANY AND FORESTRY

RAPHAEL ZON, *Editor*J. V. HOFMANN, *Assistant Editor*

100. ANONYMOUS. Allgemeine Bedingungen für die Verpachtung forststaatlicher Jagden in Preussen. [Leasing of hunting rights on Prussian State Forests.] Forstwiss. Centralbl. 42: 100-105. 1920.—In general, hunting is managed by the State forest authorities, but in a few cases is leased to private individuals. The conditions and forms governing such leasing are given.—*W. N. Sparkawik.*

101. ANONYMOUS. Facts about depletion of our forests. Amer. Forest. 26: 433-435. 1920.

102. ANONYMOUS. Forestry in France. Australian Forest. Jour. 3: 141-142. 1920.—A description is given of the French method of silvicultural management of a practically normal beech forest of 26,000 acres having a negligible admixture of oak in the State forest in the neighborhood of Lyons-la-Fôret in the Department Eure. The present method of regulation is based on the uniform compartment system with natural regeneration.—*C. F. Korstian.*

103. ANONYMOUS. Industrial research in forest products. Amer. Forest. 26: 401-407. 7 fig. 1920.—A brief of the work of the Forest Products Laboratory, Madison, Wisconsin.—*Chas. H. Otis.*

104. ANONYMOUS. Kurze Übersicht über die wichtigsten Kennzeichen der verschiedenen Lärchenarten. [A brief review of the most important characteristics of the various Larch species.] Naturwiss. Zeitschr. Forst- u. Landw. 18: 46-51. 1920.—This brief review contains a key for the cones of the 19 species and varieties in the Larch family, a key for the needles and twigs, and a brief description of each species or variety.—*J. Roeser.*

105. ANONYMOUS. Progress of the purchase of Eastern national forests. Amer. Forest 26: 454-460. 2 maps, 4 fig. 1920. [From report prepared by the National Forest Reservation Commission.]

106. ANONYMOUS. The utilization of sand wastes. Australian Forest. Jour. 3: 138-139. 1920.—A brief review is given of the experience of France in the fixation and economic utilization of barren areas of shifting sand in the Landes through the planting of cluster pine (*Pinus pinaster*), and a plea is made for the adoption of similar measures in Australia.—*C. F. Korstian.*

107. ANONYMOUS. Die Verhandlungen der Preussischen Landesversammlung über den Staatshaushaltsplan der Forstverwaltung. [Action in the Prussian legislature on the Forest Service budget.] Forstwiss. Centralbl. 42: 106-114. 1920.—By the Versailles treaty there was a definite loss to Prussia of 581,513 hectares of forest with an income of 23,459,000 marks, besides a possible loss of 346,862 hectares and income of 24,519,858 marks in the plebiscite areas, and 34,958 hectares and 2,208,000 marks in the districts of Aachen and Trier. Although wood prices have risen along with all other prices, the Forest Service must try to keep them down within reason. It is proposed to cut one-third more wood than usual to supply fuel needs, especially of the bakers; but in many places increased production of fuelwood will have to be made at the expense of construction timber or mine timbers. Receipts from turpentine brought in a considerable revenue, but can be counted on only so long as the industry is needed to supply domestic requirements and is profitable. A demand has arisen for more agricultural land, with the tendency to demand clearing of parts of the State forests. There is also considerable deforestation of private forests, so that a law is under consideration giving the government authority to regulate such clearing and requiring that all forests of more than 15 hectares be subject to State supervision. The question of salaries

and allowances is very pressing, as illustrated by the allowance granted Oberförster for maintenance of teams—3000 marks in 1917 and 6000 marks in 1918, while the actual cost of keeping a team is now 9000 marks per year. In connection with the salary question it was stated that between October 1, 1918, and October 1, 1919, forest vandals killed 13 forest officers and wounded 3 others.—*W. N. Sparhawk.*

108. ANONYMOUS. *Vorschriften über das Wirtschaftsland (Dienstländereien) der Forstdienststellen in Preussen.* [Regulations regarding farm land connected with Forest Service positions in Prussia.] *Forstwiss. Centralbl.* 42: 69–73. 1920.—Most forest officers are granted a small area of garden, meadow, or pasture, in order to enable them to keep teams, raise at least part of their own food, especially in outlying districts, and also to make them reasonably independent of the local population. They are supposed not to raise anything to sell. Rules are given concerning the granting of such land, its cultivation, fencing, etc.—*W. N. Sparhawk.*

109. BARBEY, A. *Congrès de la Société forestière de Franche-Comté et Belfort.* *Jour. Forest. Suisse* 71: 50–54. 1920.—The first post-war meeting of this French forestry society was devoted to an examination of the forest of Haguenau, Alsace. Comprising 13,699 hectares, this forest is fifth in rank of French domainal forests and is conjointly owned by the state and by the village of Haguenau. Originally put under systematic management by the French in 1845, it was radically changed during German control (1874–1919) through the application of German systems employing artificial reforestation. Details of German maladministration from the French viewpoint are described. The effort of the French foresters in resuming control will be to bring the forest again under the regime of natural reproduction according to the best traditions of forestry in France.—*C. J. Kraebel.*

110. BARBEY, A. *Un parasite des pousses du chêne.* [A parasite of oak shoots.] *Jour. Forest. Suisse* 70: 129–131. Sept.–Oct., 1919.—*Stenolechia gemmella* L., also known as *Poecilila nivea* Han.—*C. J. Kraebel.*

111. BEATH, O. A. *Poisonous Plants.* *Proc. Soc. Promotion Agric. Sci.* 39: 39–47. 1919. See *Bot. Ansts.* 6, Entry 475.

112. BELL, T. R. *Administration report of the forest circles in the Bombay Presidency (including Sind) for 1918–19.* 133 p. Bombay, 1920.—The usual annual report on forest operations in the province. From 66.6 per cent to 94.3 per cent of the total forest areas is open to grazing. The opening of some of the areas closed to grazing, owing to fodder famine, caused considerable damage to coppice growth. During the year the gross revenue increased 17 lakhs (lakh = 100,000 Rs.) over the preceding year and by 30 lakhs over the average of the preceding 5 years. The past year the net revenue equalled 46.3 per cent of the gross revenue. *Caesalpinia brevifolia*, the pods of which contain 50 per cent tannin and having a tannin value superior to Divi-divi (*Caesalpinia coriaria*), has been recommended for experimental cultivation in dry regions. Later it is expected to try this species out on a commercial scale in the successful regions. A private company is planning to test the possibilities of the manufacture of bamboo paper pulp on a commercial basis for a period of 2 years. In timber seasoning experiments good results were obtained by alternate water and air treatment of certain species, and definite recommendations as to methods have been made. On the subject of organization, the following statements are made: "There is no doubt that the divisions existing are too large in extent for management by a single Divisional Forest Officer and their area will have to be reduced in the near future. Regeneration work has never been satisfactory owing to want of staff for supervising—also for execution. And under the new proposed system of clear-cutting about to be introduced in revised working plans, even requirements for silvicultural operations recognized up to the present will be insufficient. Everything, the whole future of the forest, will depend upon adequate, highly trained supervision. For effectiveness, it will have to be European too; the forest life and strenuous, physical exertion entailed make that an absolute *sine qua non* for successful issue. The ordi-

nary, intensively-worked division should certainly not exceed 200 square miles in area, whereas they are now well over 400. The sooner this is recognized, the better.' Appended to the report are a number of tables of statistics on forest and administrative subjects.—*E. R. Hodson.*

113. BERNBECK. *Das Wachstum im Winde.* [Growth and wind.] *Forstwiss. Centralbl.* 42: 27-40, 59-69, 93-100. 1920.—The author discusses the adaptation of vegetation to wind and the effects of wind on vegetation, with especial reference to forest growth. Adaptation is to enable the plant to withstand the physical impact of wind, or to prevent excessive evaporation from the plant tissues, or both. Wind firmness is not an inherent characteristic of any given species, although the tendency toward windfirmness may be inherited; thus a fir grown in the open may be much more wind-firm than an oak grown in a dense stand protected from wind. Under the right conditions any tree can develop a wind-firm form. This fact can be utilized in silvicultural management, so as to minimize loss from windfall. (35,000,000 cubic metres of timber, principally coniferous, was blown down in Germany during the last century.) Wind climate often governs the geographical distribution of trees. For instance, conifers are most liable to injury during the winter months; so sites exposed to continuous winter storms (if fertile enough to allow tall tree growth) are usually occupied by hardwoods, while mountain slopes and plateaus where heavy early summer winds prevail are occupied by conifers. Wind affects the growth and form of trees not only indirectly, by its influence on such site-factors as soil moisture, transpiration, temperature, and exposure of foliage to the light, but also directly, by its physical effect on the plant tissues. Internal stresses and friction, between the fibres result in eccentric growth, and also help to stunt the tree by interrupting sap-flow and by affecting cell structure and turgescence. Investigations made at Bonn showed clearly that the stunting effect of wind increases rapidly with wind velocity.—*W. N. Sparhawk.*

114. BERNBERG. *Die Wasserversorgung der Pflanzen im Winde.* [The supply and maintenance of water in plants during wind.] *Naturwiss. Zeitschr. Forst- u. Landw.* 18: 121-141. 1920.—The physiological action of the mechanical strength of winds in relation to transpiration is manifested in an increase in the amount of moisture given off. The rate of this increase is, in general, governed by the conditions of firmness or stability and inflexibility as opposed to the attacking force of the wind. The following are three ways in which the mechanical action of the wind leads to an increase in water loss: (1) The intercellular gas renews itself in spite of reaction of the stomata, whereby an increase in intercellular transpiration is involved. (2) An excess of pressure in water conducting tissue is occasioned by torsion, pressure, etc. This forces water out of the lumen and membranes of cells subject to the higher pressure into cells under lower pressure, into the intercellular spaces, or through the epidermis into the free atmosphere. This internal pressure in very strong winds can become so great that the cell walls are burst. (3) The water permeability of the outer epidermal wall and the periderm is decreased by deformations.—The quantity of transpiration is strongly influenced by the humidity of the air. Death through excessive water losses and poor conduction reaches its maximum with the lowest relative humidity. Young tender organs are not as unprotected against wind, transpiration, and frost as may be supposed. The younger and the richer the tender-walled cells are in plasma, the more resistant are they to wind pressure. The period of greatest susceptibility is immediately after the period of greatest vegetative activity. The spiral grain in trees much exposed is due to the mechanical action of the wind. The best protection against the mechanical action of wind, as illustrated by the palms and grasses, consists in a flexibility, which allows the plant to bend before the wind.—*J. Roeser.*

115. BURNS, GEORGE P. *Eccentric growth and the formation of redwood in the main stem of conifers.* *Vermont Agric. Exp. Sta. Bull.* 219. 10 p., 4 pl., 10 fig. 1920.—See Bot. Absts. 7, Entry 318.

116. EBERHARD, JULIUS. *Die Technik der Naturverjüngung einst und jetzt. Eine forstgeschichtliche Studie.* [The technique of natural reproduction formerly and now.] Forstwiss. Centralbl. 42: 161-183, 204-226. 1920.—The author describes the development of silvicultural systems, beginning with the primitive irregular selection cutting. HUNDESHAGEN developed the shelterwood system (Dunkelschlagbetrieb) with preliminary seed cuttings, with later cuttings to give light for the seedlings, and with final removal cuttings after the young growth is well established and able to thrive in the open. Natural reproduction was relied on almost entirely, being considered cheaper and more satisfactory than artificial restocking. After HUNDESHAGEN, silviculturists gradually abandoned the idea of natural restocking, and adopted clear cutting with planting. GAYER and H. MAYER described methods similar to those of HUNDESHAGEN, except that they provided for less frequent but much heavier early fellings, which resulted in less satisfactory reproduction and in more loss from windfall. BORGGREVE's method was more like HUNDESHAGEN's, but delayed the later cuttings longer. GAYER described a group selection cutting (Femelschlagbetrieb) in some respects similar to the shelterwood system, but much less satisfactory. ENGLER advised a combination of group selection and shelterwood, especially for mixed stands containing tolerant and less tolerant species. GAYER also developed a strip shelterwood system, resulting in a stand with regular age-gradations in parallel strips. WAGNER's selection strip or selection border cutting (Blendersaumschlag) provides for reproduction of tolerant species under the stand by making thinnings or selection cuttings, then for clearing strips so that the intolerant species can reproduce. MAYR described a system which he considered applicable to most of the irregular forests of the world, especially those containing many species, including the forests of the tropics. He provided for reproducing a tolerant understory at about the middle of the rotation, followed by occasional thinnings of the over-story to prevent natural losses, and fairly heavy seed cuttings at the end of the rotation, just before or just after the seed falls. The old stand is then to be removed in one or two fellings, within 5 or 6 years. KUBELKA, in his selection-strip system (Femelstreifenbetrieb) gets reproduction by opening holes in alternate strips, and gradually enlarging them. KALITSCH's Bärenthorn system and the author's wedge shelterwood system (formerly called Abruckssaumschlag, more recently Schirmkeilschlag) are very similar in providing for very frequent—annual if possible—cuttings through the stand, which do not break the canopy. The last method is particularly distinguished by the form of removal cuttings, which are developed in wedge form, beginning in the middle of the stand, so that logging will not injure established reproduction. In the author's opinion, the present German silvicultural practice (which has also been carried to Russia by foresters trained in German schools) is far behind that at the beginning of the 19th century. The prevailing forest form has changed during the last 200 years from a straight selection forest to extensive pure even-aged forests produced artificially. It is now returning gradually to a modified selection form, very much more intensively cultivated than formerly, with mixed stands and natural reproduction.—W. N. Sparhawk.

117. ENDRES. [Rev. of: REDSLOB, KURT, AND HEINRICH HORNSCHU. *Das neue Thüringen. Heft 5, Aufgaben der Thüringer Forstwirtschaft.* [Problems of Thuringian forestry.] Erfurt, 1919.] Forstwiss. Centralbl 42: 194-195. 1920.—The new State of Thuringia (Thüringen) comprises the former states: Saxe-Weimar, Saxe-Meiningen, Saxe-Altenburg, Saxe-Gotha, Schwarzburg-Sondershausen, Schwarzburg-Rudolstadt, Reuss (both). It has 403,000 hectares of forest, divided into: crown forest, 13 per cent; state forest, 37 per cent; communal forest, 13.9 per cent; institutional forest, 1.3 per cent; coöperative forest, 4.5 per cent; private forest, 30.3 per cent. It is proposed that large private holdings, under management of technically trained foresters, be subject to state supervision, and that smaller tracts be acquired by the public (state or communes). ENDRES does not believe that this proposal will appeal to the peasants. He considers too optimistic the hopes of the author for great increase of returns through chemical utilization of forest by-products. Noteworthy is the proposed organization of forest research, with about six main branches, all manned exclusively by trained foresters. These are to have parallel units set aside in the field, for prac-

tical trial of the results of research. It is also proposed to establish chairs of forestry at the University of Jena, for training of forest officers, and to found a forest and game museum.—*W. N. Sparhawk.*

118. FABRICIUS, L. [Rev. of: MÜNCH, E. *Naturwissenschaftliche Grundlagen der Kiefernharznutzung.* (Biological basis of resin production from Scotch pine.) Julius Springer: Berlin, 1919.] *Forstwiss. Centralbl.* 42: 157-159. 1920.—The German turpentine industry, which only began in 1915, has in four years developed into an important industry; and the improved methods devised as the result of intensive research have increased production very greatly over the cruder methods formerly used in Austria and even over the French and American methods. Strict application of all that has been learned will result in a yield of resin four times as great as that obtained by the methods used in 1915. MÜNCH's book covers the ground very thoroughly, both from scientific and practical points of view.—*W. N. Sparhawk.*

119. FABRICIUS, L. *Waldbau-Lehrgang im Gebiet des Langenbrander Schirmkeilschlages.* [Silvicultural excursion in the home of the Langenbrand wedge-shelterwood cutting.] *Forstwiss. Centralbl.* 42: 233-237. 1920.—The author describes the silvicultural system used by DR. EBERHARD in the Langenbrand forest (Wurttemberg). This consists of a preparatory stage, in which the stand is prepared for reproduction by repeated moderate thinnings, and a stage of removal cuttings beginning about 5 years after reproduction is established. The preparatory cuttings are intended primarily to get rid of raw humus, which may also be removed by hand either over the whole area or in seed-spots. These cuttings also make room for reproduction, especially of tolerant species, to start. The removal cuttings are rather light, and repeated every year if practicable. They begin in the interior of the stand and progress outward, beginning with small openings, which are gradually enlarged into a wedge shape with the point toward the wind. The shape of opening is not definite, but may be varied to suit local conditions. Damage from storms and logging is reduced to a minimum, and natural reproduction is very successful. Of the whole area, 92 per cent has been reproduced naturally. The principal characteristic which distinguishes this from certain other methods is the shape and arrangement of the cuttings so as to eliminate damage from logging and from winds.—*W. N. Sparhawk.*

120. FARRINGTON, H. A. *Annual progress report on forest administration in the presidency of Bengal for 1918-19.* 51 p. Calcutta, 1920.—The usual annual report dealing with forest operations in the province. It is reported that 16 per cent of the reserved forests and 3 per cent of the protected forests were open to grazing, and that the entire area of the unclassified forest is always open for this purpose. Unrestricted grazing and lack of fire protection caused the Muli bamboo to fail in re-establishing itself properly after seeding. Wherever cattle have access (practically on all areas within a mile of the forest boundary) seedling regeneration of most kinds of trees is destroyed. It is necessary to fence planted areas to protect them from damage by cattle grazing. In the unfenced hills natural regeneration is entirely destroyed by cattle. Above 5,500 feet in altitude natural reproduction in coppice felling is not successful and must be supplemented by planting. At lower elevations the coppice system produces excellent results. Burned areas in coppice cuttings give success with a large number of species, including seedlings of Mallata, Toon, and other species. Experiments were undertaken with growing blue gum (*Eucalyptus globulus*) for fuel purposes. At the close of the year there were 50 forest villages, totaling an area of 7508 acres. The surplus at the close of the year was 1,121,760 Rs. Twenty-one form tables and a map of the province are appended. In chapter seven is given a review of forest administration in Bengal for the preceding 5-year period.—*E. R. Hodson.*

121. FEDERAL HORTICULTURAL BOARD, U. S. DEPT. AGRIC. [Restrictive legislation and notices of quarantines in U. S. A.] *Service and Regulatory Announcements* 68: 52-111. 1920.

122. GARR, H. D., AND GEORGE E. E'WE. Hemlock bark (*Tsuga canadensis*) for pharmaceutical purposes. Jour. Amer. Pharm. Assoc. 9: 567-573. 3 fig. 1920.—See Bot. Absts. 6, Entry 819.

123. GINZBERGER, A. Zwei neue Standorte der gefeldert-rindigen Buche, *Fagus silvatica* var. *quercoides* Pers., in Mittel Italien und Slavonien. [Two new site-localities of the grooved-barked beech, *Fagus silvatica*, var. *quercoides* Pers., in central Italy and in Slavonia.] Naturwiss. Zei. schr. Forst-u. Landw. 18: 39-41. 1920.

124. HAY, R. DALRYMPLE. Progress of forestry under independent management in New South Wales. Australian Forest. Jour. 3: 151-156. 1920.—A record of established progress in forest management by the Forestry Commission of New South Wales following a needed reform is given under these topics: classification, demarkation and organization, fire protection, utilization and regeneration of hardwood forests, publicity work, forest grazing, forestry statistics, forestry education, coniferous plantations, research, and forest revenue.—C. F. Korstian.

125. HENRY, AUGUSTINE. The afforestation of water catchment areas. [Abstract.] Rept. British Assoc. Adv. Sci. 1919: 337. 1920.

126. HIRST, E. C. State forest fire protection. Amer. Forest. 26: 408-409. 1920.

127. HODSON, E. R. Some present day problems in forestry. Utah Acad. Sci. 1: 45-54. 1918.—Paper presented to the Academy in April, 1911.

128. HOHENADL, W. Die Hebung der Alpwirtschaft. [Promotion of the alpine dairy business.] Forstwiss. Centralbl. 42: 41-59. 1920.—The author contrasts the development of the dairy industry in Allgau with that in Upper Bavaria. The difference is to a considerable extent traceable to the difference in character of ownership of the mountain pastures as well as of the mountain forests. This industry is in very close contact with the forest industry, and foresters are especially favorably situated for taking the lead in promoting better methods and more conservative, and at the same time, more intensive utilization.—W. N. Sparhawk.

129. HUTCHINS, D. E. Insignis-pine disease. Jour. Agric. New Zealand 16: 37. 1918.—See Bot. Absts. 5, Entry 1273.

130. JUDD, C. S. The kauri pine. Hawaiian Forester and Agric. 17: 167-169. Pl. 1. 1920.—This is reported as being the most promising and widely useful tree for planting in the Hawaiian Islands for the purpose of producing lumber. This species, *Agathis australis* shows a rapid growth in the Islands, "averaging a growth of 1 inch in diameter every 4½ years." It was introduced into Hawaii about forty years ago.—Stanley Coulter.

131. KORSTIAN, C. F. Value of scientific research in forestry. Utah Acad. Sci. 1: 186-194. 1918.

132. LEININGEN-WESTERBURG, (GRAF ZU). Rauchschiiden und einschlagige bodenkundliche Fragen. [Smoke injury and related matters of soil science.] Forstwiss. Centralbl. 42: 18-93. 1920.—See Bot. Absts. 7, Entry 459.

133. MACKAY, H. Forestry in Victoria. Australian Forest. Jour. 3: 147-150, 179-182. 1920.—The second and third installments of a continued article. The silviculture of eucalyptus forest is briefly treated. The following methods of cutting are advocated as the simplest and best forms of management for adaptation in Australia: (1) clear cutting; (2) modified selection; (3) for young forest, coppice with standards, or a modification of the shelterwood compartment system; (4) simple coppice, or the clear cutting of pole timber. A rotation of 20 to 30 years for a box and ironbark forest will produce pole timber from 6 to 9 inches in diameter, with some 12-inch timber. The progress made in plantation work and in gifts of trees for shelterbelts to small settlers is noted.—C. F. Korstian.

134. MAXWELL, HU. The uses of wood. Wood for musical instruments. Amer. Forest. 26: 532-539. 16 fig. 1920.
135. MOREILLON, M. Dommages causés aux forêts du canton de Vaud par le foehn des 4 et 5 janvier 1919. [Damage to the forests of Vaud (Switzerland) by the foehn of January 4 and 5, 1919.] Jour. Forest. Suisse 71: 41-44. 1920.—A brief presentation of reasons why this wind should have caused local wind-throw although the foehns of other years have never been known to do so.—C. J. Kraebel.
136. MOREILLON, M. Influence de l'ombrage sur la valeur des gazons dans les pâturages boisés. [The influence of shade upon the value of grasses in wooded pastures.] Jour. Forest. Suisse 70: 131-142. 1919.—See Bot. Absts. 7, Entry 39.
137. NIKLAS, H. Die Bedeutung der Geologie für die Land- und Forstwirtschaftliche Bodenkunde. [The significance of the science of geology with relation to agricultural and forest soil science.] Naturwiss. Zeitschr. Forst-u. Landw. 18: 22-35. 1920.—See Bot. Absts. 7, Entry 478.
138. NIKLAS, H. Übersicht über Bayerns Bodenverhältnisse. [Summary of Bavarian soil conditions.] Forstwiss. Centralbl. 42: 123-135. 1920.—See Bot. Absts. 7, Entry 461.
139. PACK, CHAS. L. Fire protection and more public forest land. Amer. Forest. 26: 526-528. 1920.
140. PIETSCH, ALBERT. Wie erklärt sich das lange Hängenbleiben der Blätter an einigen phanerogamen Holzgewächsen im Herbste 1919? [What is the explanation for the late retention of the foliage of several phanerogamous woody plants in the fall of 1919?] Naturwiss. Zeitschr. Forst-u. Landw. 18: 150-155. 1920.—A combination of adverse conditions—a late spring, a cool summer, a wet October, and an early November frost—was responsible for the rather extraordinary retention of the foliage in the pear (*Pirus communis*), red thorn (*Crataegus monogyna*), the garden rose, blackberry (*Rubus caesius*), and peach (*Prunus persica*) in the fall of 1919. The explanation lies in the meteorological conditions through the year.—J. Roesser.
141. PRANTNER, E. F. The forests of a new republic. Amer. Forest. 26: 522-525. 9 fig., 1 map. 1920.—A brief discussion of forest conditions in Czechoslovakia.—Chas. H. Otis.
142. RECKNAGEL, A. B. New York's forests and their future. Amer. Forest. 26: 518-521. 4 fig., 1 table. 1920.
143. ROTH, FILIBERT. Another word on "light burning." Amer. Forest. 26: 548, 572. 1920.
144. RUBNER, K. Forstliche Standortsgewächse im westlichen Moränengebiet Bayerns. [Vegetation as forest site indicators in Bavaria.] Forstwiss. Centralbl. 42: 135-144. 1920.—The author discusses CAJANDER's theory that forest sites can be classed into a very few types based on key plants, such as *Oxalis*, *Vaccinium myrtillus*, and *Calluna*, regardless of elevation, soil conditions, latitude, or other factors, and that the growth of the same species within one type wherever located is about the same, but is very different in different types. RUBNER does not believe that such general classification, even with the subtypes CAJANDER proposed, can be made to apply to a large region, but believes that each locality will have certain plants that indicate the character of the different sites, which may or may not be common to other localities. He illustrates this by discussing the vegetation under the forests in the districts of Betzigau, Ottobeuren, Sachsenried, and Denklingen, which is the optimum spruce region in Bavaria and possibly in all Germany, with yields far above the average for Quality I sites. Indicator plants show particularly the humus conditions; i.e., whether the soils are mild, with normal decomposition of humus, or whether they are becoming acid with raw humus.

Such plants may be *guide-plants*, practically always found on a particular kind of soil; *accessory indicators*, frequently present but often missing; and *regional indicators*, found only in certain regions. Plants indicative of mild soils are *Oxalis acetosella*, *Asperula odorata*, *Impatiens noli-me-tangere*, *Galium rotundifolium*, *Elymus europaeus*, *Milium effusum*, *Brachypodium silvaticum*, *Carex silvatica*, *Catharinaea undulata*, *Mnium undulatum*, *Hypnum* spp. Indicators of beginning or continuing raw humus formation are: *Vaccinium myrtillus*, *Festuca silvatica*, *Lycopodium annotinum*, *Polytrichum formosum*, *Dicranum scoparium*. This matter deserves much more attention from forest investigators, since it has a very direct bearing upon silvicultural practice, especially in connection with natural reproduction and with methods of thinning.—*W. N. Sparhawk.*

145. RUBNER, K. *Holzpreise in Süddeutschland in früherer Zeit.* [Wood prices in South Germany in former times.] Forstwiss. Centralbl. 42: 226-233. 1920.—The author discusses prices of wood (chiefly firewood) in various localities, going as far back as 1630 in some instances. Especially noteworthy is a rapid increase in prices about the middle of the nineteenth century, which was attributed by some to increased population, rise of wood-using industries, and decreased wood production, and by others to an era of speculation. Just as relief came then through the development of railroads and the rise of a world trade in wood, so can relief from present abnormal wood prices, which are also due to a considerable degree to speculation coupled with inadequate supplies, come only with the resumption of imports from Russia or other exporting countries.—*W. N. Sparhawk.*

146. SCHEIDTER, FRANZ. *Schlagruhe und Rüsselkäfer.* [Suspension of cuttings and weevil damage.] Forstwiss. Centralbl. 42: 144-150. 1920.—The author discusses the life history of the weevil, and shows that it can not be eliminated from a forest by temporarily suspending cuttings, as has been proposed. Contrary to general belief, the beetle flies for long distances during the mating period, and may attack newly planted trees far away from any cutting area. Suggested control measures include cleaning up cuttings, with grubbing out of stumps as soon as possible after logging; smearing of individual trees, where practicable, with bands of glue or tar; and the construction of traps by blazing fresh stumps just above the ground and covering the blazes with loose bark, from beneath which the beetles can be scooped up daily or more often.—*W. N. Sparhawk.*

147. SCHMAUSS, A. *Über Sturmgefährdungen.* [Concerning storm damage.] Forstwiss. Centralbl. 42: 189-194. 1920.—Prevailing winds in central Europe being from the southwest or west, trees are ordinarily adapted to resist winds from those directions, and are likely to be wind-thrown only by winds from other quarters. Storms from the east or northeast would be most destructive, but they are exceedingly rare. Those from the southwest—of which the föhn winds are most common—are seldom strong enough to do great damage, so that only the fairly strong winds—20 meters per second and over—from the northwest need be considered in forest management. The origin and behavior of these winds is discussed in some detail. It is concluded that the best direction for succession of cuttings is from northeast to southwest, since this will favor reproduction and at the same time will allow a minimum of damage from northwest winds.—*W. N. Sparhawk.*

148. SCHREINER. *Blitzschaden an einer liegenden Eiche.* [The work of lightning on a fallen oak.] Naturwiss. Zeitschr. Forst-u. Landw. 18: 42-43. 1920.—The author records a phenomenon which he has not encountered in any of his previous practice. The oak stem in question was 7.4 meters long and 0.46 m. in diameter, D I B. The tree had died and fallen and the rotten butt had been removed, while the remaining section on the ground was sound. One-half of the stem was free of limbs. The woody fibers were straight; no twisted grain was in evidence. The stem lay in the midst of a thin stand of beech about 30 meters high. Lightning struck directly on the fallen stem, and ran the full length of it, making a three quarters revolution. Since it could not have followed the grain, it is thought the curvature of the stroke was due to the attraction from the damp portion of the stem lying against the soil. The soil is derived from sandstone.—*J. Roeser.*

149. S(CHÜPFER). Englands Waldpolitik vor und nach dem Kriege. [England's forest policy before and after the war.] [Chiefly a discussion of an article by Ivar Trägårdh in Svenska Dagbladet, 1919, No. 344.] Forstwiss. Centralbl. 42: 150-156. 1920.—England's power depends on her fleet, which requires coal; the latter cannot be obtained without a supply of mine timbers. These had hitherto been obtained cheaply from France and Scandinavia, but just prior to the war increasing prices had made people begin to think of the home forests, which were mostly hardwoods except for small areas of conifers in Scotland. Early in the eighteenth century it had been decided to plant 100,000 acres with oak for ship timbers, and by 1823 half of this area was planted. Then the coming of steel ships put an end to this project. With the outbreak of the World War, there was great difficulty in getting sufficient timber; half of England's forests were cut down, and the rest would have been cut down if the material could have been got out easily. Of the monthly consumption of 100,000 tons of mine timber, England supplied 40,000 tons and France the rest. From 1916 to 1918 about 17,000,000 tons of timber were cut, or more than 20 years' normal cut. The report of the Forestry Subcommittee of the Ministry of Reconstruction is outlined. The measures recommended were adopted in the law of September 1, 1919, which created a Forest Commission with broad powers and an appropriation of £3,500,000. The reviewer suggests that estimates of costs and of returns may be somewhat optimistic, and that allowance was not made for a possible future drop in prices as home production increases, but points out that there are other advantages, such as insuring an emergency supply as well as making productive large areas of waste land, whose value cannot be estimated.—W. N. Sparhawk.

150. SCHUSTER, MATTHÄUS. Die wirtschaftliche Hegung und Ausnützung der bayerischen Hohen Rhön. [The economic development and use of the Bavarian High Rhön.] Naturwiss. Zeitschr. Forst-u. Landw. 18: 1-10. 1920.—The Bavarian High Rhön Mt. region is noted for its large areas of unused meadowland, which because of soil and location are unfit for agricultural use. During the war, and for a considerable time previous, this territory had been practically neglected. It is known that as late as the end of the eighteenth century, the region was one of considerable economic importance; this was due chiefly to the efforts of the abbots of Fulda, who developed the limited mineral resources and the numerous springs around Brückenau, and also made use of the large, uncultivated meadows in the mountains as pastures for horses and cattle. At present, the whole region is dead and awaits a resurrection. Its agricultural value is low; it has no great advantage over other areas in its mineral resources. The extensive mountain meadows, however, can and must be utilized for cattle grazing, in order to assist in the economic restoration of industrial Germany.—J. Roeser.

151. TAYLOR, T. W. Kurrajong as a fodder tree. Australian Forest. Jour. 3: 186-188. 1920.—The cultivation of kurrajong (*Sterculia diversifolia*) for fodder purposes is advocated. This species is one of the best fodder trees as a stand-by in times of drought, as well as a tree that is very ornamental and useful for shade purposes on the open plains.—C. F. Korstian.

152. TUBEUF, KARL FREIHERR VON. Über die Zweckmässigkeit der Zusammenlegung Kleinparzellierten Waldbesitzes. [Concerning the necessity of consolidating small parcelled-off forest holdings.] Naturwiss. Zeitschr. Forst-u. Landw. 18: 155-162. Fig. 1-3. 1920.—The author describes three examples of forest areas, subdivided into small holdings with distinct division lines, which he found on the foothills of the Alps; namely, at Füssen, at Kohlgrub, and at Brannenburg. In the case of the first two, where long strips of forest, each privately owned, are separated by strips of meadowland; the forest is injurious to the growth of grass in the meadows; the open meadows leave the forest open to severe damage by windfall, etc.; and there is no system or definite plan of utilization of the forest product. In the last-mentioned case, a steep mountain side of approximately 155 ha is parcelled into 60 separate holdings, these being in narrow strips parallel to the slope and separated by wide lanes, 10-30 meters wide. Some of the strips themselves are but 8 meters wide. The consolidation of the holdings on the tract under one management will mean uniform management and harvesting

of product and closer utilization of the soil, since all of the lanes but one will be allowed to regenerate. The revenue derived would be pro-rated according to the area held by each member of the association or ownership, and the yield would be increased five or six times. Statistics show that the average yield from small holdings is 2 cubic meters of wood per year per ha, while on state forests, it amounts to 4-6 cubic meters. In North Germany, the formation of forest associations by direct state aid is desirable to secure reforestation on the large plains; in South Germany it is desirable in order to prevent the damage resulting from parcelling of woodlands into small tracts; and in the mountains in order to introduce uniform and efficient methods of logging. The demands of the time call for utmost utilization of the soil.—*J. Roeser.*

153. WILBRAND. *Eichenhochwald.* [Oak high forest.] *Forstwiss. Centralbl.* 42: 183-189. 1920.—Oak is one of the most valuable and necessary woods, and is in great demand, especially in large sizes. It should always be grown to produce large-sized material, and the smaller sizes wanted can be obtained as by-products, from thinnings. For short rotations spruce, pine, and beech are more profitable. Oak grows slowly, and needs plenty of light. It should always be grown in pure stand (during the first part of the rotation); and best results follow clear cutting of small areas, with planting, and cultivation of garden crops for two years between the rows. After the stems have made their height-growth and the crowns have begun to form, thinnings should commence, and should follow every 4 or 5 years, so as to keep the crowns of the reserves always free and prevent dying off of even the lower branches. This will prevent dead knots. Beech can be under-planted when the boles have reached their full height, after the crowns have started to spread. This method will result in the maximum possible clear bole, in regularly spaced annual rings, which is an advantage for many purposes, and in reasonably fast growth.—*W. N. Sparhawk.*

154. ZELLER, S. M. Humidity in relation to moisture imbibition by wood and to spore germination on wood. *Ann. Missouri Bot. Gard.* 7: 51-74. *Pl. 1, 5 fig.* 1920.—See *Bot. Absts.* 7, Entry 400.

155. ZIMMER, W. J. The need of softwood introduction. *Australian Forest. Jour.* 3: 184-185. 1920.—A brief discussion of the demand for softwoods, and an argument for more extensive planting of pines. In a list of trees reported to be growing in the State Nursery at Macedon, Victoria, many of which measure up to 108 feet in height and a stem girth of more than 9 feet, ten North American conifers are noted.—*C. F. Korstian.*

156. ZON, RAPHAEL. Forests and human progress. *Geog. Rev.* 10: 139-166. 1920.—The author recognizes three stages in the development of man's relation to the earth's forested areas from prehistoric times until the present. These stages are designated: (1) *Civilization dominated by forests*, (2) *civilization overcoming the forests*, and (3) *civilization dominating forests*. While forming a natural sequence, it is pointed out that the stages made unequal progress in different parts of the earth. For illustration, Central Africa and South America are now in the first stage; a considerable part of North America and Asia are in the second; but in Europe and parts of the United States the third stage is reached. The first stage deals with prehistoric and early historic man. It is traced through indirect means, as the migration of races, the configuration of ancient forests, and from folk lore, myth, and the vestiges of primitive religions. The second stage denotes man's progress in the production and use of tools of an advanced and efficient type, and shows an increasing pressure for tillable land. This stage lies for the most part within the historic period, although place names in certain parts of Europe are excellent indirect evidence of the progress of early clearings and forest settlements. The third stage shows civilization triumphant over its ancient enemy, and brings the story down to modern times. It deals with current movements and the immediate past.—*E. R. Hodson.*

GENETICS

G. H. SHULL, *Editor*J. P. KELLY, *Assistant Editor*

157. ANONYMOUS. [Rev. of: (1) HARRISON, J. W. HESLOP. A preliminary study of the effects of administering ethyl alcohol to the lepidopterous insect, *Selenia bilunaria*, with particular reference to the offspring. *Jour. Genetics* 9: 39-52. Dec., 1919. (2) DUERDEN, J. E. Methods of degeneration in the ostrich. *Jour. Genetics* 9: 131-193. Pl. 5-6, 8 fig. Jan., 1920.] *Nature* 104: 609. 1920.

158. ANONYMOUS. Vägledning på försöksfälten 1920 vid Svalöf och filialerna. [Guide to the experimental fields of Svalöf and its branch experimental stations, for the year 1920.] 1.45 X 200 mm., 52 p., 1 map. Landskrona, 1920.—Pamphlet intended as a manual for visitors. During this year 14,059 plots (of which 94 are mass-cultures) have been laid out.—K. V. Ossian Dahlgren.

159. BACH, SIEGFRIED. Zweierlei Weisslinge bei Mais. [Two kinds of albinos in maize.] *Zeitschr. Pflanzenzücht.* 7: 238-241. June, 1920.—From open-pollinated ears of maize, the author reports the occurrence of two types of albinistic seedlings. One ear produced 170 green and 4 pure white seedlings, the latter dying within a month's time. The other ear produced 160 green and 5 partially green (striped) plants which died in two months. The low proportion of albinistic seedlings is due to random open-pollination with a small amount of natural self-pollination. Author assumes that chlorophyll content in maize is dependent upon at least two pairs of factors, XX and YY ; and that the parent ears noted above had the genotypic formulae $XXYy$ and $XyYY$ respectively.—E. W. Lindstrom.

160. BAUMANN, E. Beiträge zur Kenntnis der Rapspflanze und zur Züchtung des Rapses. [Contributions to a knowledge of the rape plant and to the breeding of rape.] *Zeitschr. Pflanzenzücht.* 6: 139-184. 2 figs. Dec., 1918.—A program for improving the rape plant was followed through a period of nine seasons (1909-1917), together with a study of the inheritance of certain characters influencing the performance of the plant under a variety of weather conditions. Of the qualities concerned in making for a larger gross yield, and greater desirability of product, the adaptation of different varieties to climate, particularly with reference to the time of resumption of growth in spring and the latest occurrence of spring frost, was found to be of much practical importance. Of primary interest, also, were found the capacity of varieties to resist insect attack, and to occupy gaps in the stand by the development of branches. A detailed study of external morphology showed that the taller the plant, the greater was the number of internodes, and the higher the insertion of the latter on the axis. The increase in length of lateral branches of the first order from tip toward base begins as a straight line function, but toward the end is lessened considerably. A similar relation obtains in the case of branches of the first and higher orders. Generally, in plants having a long axial stem, the primary and secondary branches are shorter, and the inflorescence more crowded. Plants of the higher continuity states, possess in a larger measure the qualities making for increased productivity, as the different morphological elements tending toward greater yield are more numerous and better differentiated. Adaptation to a particular climate is largely contingent on the capacity to form a vigorous healthy growth in fall, and to develop shoots rapidly in spring, through which damage by late frosts and insects is resisted. An excessively vigorous growth, on the other hand, may bring about a spindling condition, encourage decay, and render the crop more subject to late spring frosts. In all cases, varieties and races requiring the longer periods for maturing gave the greater yields. The performance of species or genera making for adaptability to climate is an expression of the irritability of its cells to thermal stimuli. The importance of physiological data derived from breeding experiments to the ecology and the distribution of plants is emphasized.—Charles Drechsler.

161. BECKER, J. Beiträge zur Züchtung der Kohlgewächse. [Contribution to the breeding of the Brassicas.] Zeitschr. Pflanzenzücht. 7: 91-99. Dec., 1919.—Discusses the necessity of seed selection. Outlines a method whereby the four best plants are selected from a good variety. These four plants are over-wintered and planted together the following year. Pods from each plant are harvested separately, and each pod is handled as a unit. Seeds of each are sown the following spring, and each individual seedling is grown in a pot and transplanted to the field. Undesirable lines and plants are eliminated after taking careful data on plant characters, production, and food value. The ten best plants are selected, and the following year the four best are again grown in an isolation plot. A second selection of plants is made in the fall and carefully over-wintered. These produce seed for the main crop. A single *Brassica* plant produces 2100 to 15,000 seeds—sometimes as high as 36,000.—The writer favors the use of plants for seed production which themselves have produced well-developed heads. States that different sorts should be 400 to 500 meters apart in the field to prevent cross-pollination.—H. K. Hayes.

162. BECKER, J. Serologische Untersuchungen auf dem Gebiete von Pflanzenbau und Pflanzenzücht. [Serological investigations in the realms of plant culture and plant breeding.] Landwirtsch. Jahrb. 53: 245-276. 1919.—By the use of serums prepared by injecting plant extracts into animals it is possible to distinguish between seeds which are so nearly alike that by examination it is difficult to classify them; for example, seeds of *Brassica napus* and *B. rapa*. It is also believed that it will be possible to determine genetical differences, by this means, where no morphological differences can be made out, in closely related individuals.—D. F. Jones.

163. BLAKESLEE, A. F. Unlike reaction of different individuals to fragrance in *Verbena* flowers. Science 48: 298-299. Sept. 20, 1918.—On the basis of susceptibility to the fragrance of two varieties of *Verbena*, A and B, 48 persons could be classified into two groups. The one group, of 32 persons, was susceptible to fragrance in variety A but not to any in B; for the other group or 16 persons the reverse was true.—Edgar Altenburg.

164. BLARINGHEM, L. Couleur et sexe des fleurs. [Color and sex of flowers.] Compt. Rend. Soc. Biol. 83: 892-893. June, 1920.—Many horticultural varieties of Sweet William, *Dianthus barbatus*, are hybrids, and sometimes show hybrid origin by a mosaic splitting, which appears only on a few shoots and only on old plants. One remarkable plant showed, during two seasons, color changes in the petals which ran parallel with the sexual development of each flower. *D. barbatus* is hermaphroditic and protandrous. During 5-8 days while anthers are shedding petals are white. Within subsequent 24-48 hours stigmas become functional, and petals turn bright red. This abrupt change should furnish a convenient index in a study of the inheritance of those physiological conditions which are associated with the sexes.—Merle C. Coulter.

165. BLARINGHEM, L. Hérité et nature de la pélorie de *Digitalis purpurea* L. [Heredity and nature of the peloria of *Digitalis purpurea* L.] Compt. Rend. Acad. Sci. 171: 252-254. July, 1920.

166. BLARINGHEM, L. Variations de la sexualité chez les composées. [Variations in sexuality in the Compositae.] Compt. Rend. Soc. Biol. 83: 1060-1062. July, 1920.—Author recalls supposition of HILDEBRAND and VAN UEXKULL-GYLLENBAND to effect that common composites are in state of evolution away from hermaphroditism. This opinion was based on existence of florets in intermediate conditions. Author says his observations on *Centaureas* of *jacea* group do not support such an hypothesis. Plants from four stations gave evidences of having resulted from hybridization of *C. jacea* and *C. nigra*. In the sterile (peripheral) flowers there was pollen sterility and variation in degree of ciliation of a certain part of the achene; and there were appendages, such as free stamens or deformed styles.—J. P. Kelly.

167. BOWER, F. O., J. GRAHAM KERR, AND W. E. AGAR. **Lectures on sex and heredity delivered in Glasgow, 1917-1918.** 16mo vi+119 p., 49 fig. Macmillan Co.: London, 1919. —Distinctly popular; profusely illustrated. Introduction: Terms defined (prefers "syngamy" to fertilization); nature and function of sex discussed; its features contrasted with asexual reproduction. (1) Origin of sex in plants: Origin and differentiation of sex illustrated by *Ulothrix*, *Ectocarpus* spp., *Fucus* spp.; likens primitive isogamous plants to plant proletariat, producing numerous offspring with little physiological capital, so that each individual when produced must depend chiefly on its own efforts. Heterogamous forms, with well-nourished eggs, are capitalists whose progeny start life with an inheritance. Parallel evolution in several lines indicates that advantage is with latter; sex process in fern and angiosperm is described. (2) Effect of fixed position on sexuality of plants: detailed discussion of fertilization mechanism in ferns, pollination and pollen-tube growth in angiosperms; advantages of "nursing habit" in latter for their embryos. (3) Reproductive process in animals: some general principles; differentiation of sex illustrated by *Copromonas*, *Stylorynchus*, *Plasmodium*; in *Copromonas*, discusses auto-intoxication which comes after generations of a sexual reproduction, and how unfavorable conditions favor the sex act; sketches embryology in higher animals, early differentiation of gonads, continuity of germ-plasm, inheritance of acquired characters. (4) Modifications of reproductive process as adaptations to life on land: adaptations by various frogs and toads, representing "attempts to get rid of the free aquatic existence during the early stages of the life-history;" gross embryology of chick; monotremes, marsupials, higher mammals; transplantation of ovaries; transmission of disease from mother to offspring. (5) Heredity: Physical basis of heredity, using *Cyclops* as example; DARWIN's pangenesis, GALTON's and WEISMANN's views; isolation of germ-plasm in *Cyclops*; inheritance of acquired characters; MENDEL's law, with Andalusian fowl as example; dominance illustrated by red X white *Antirrhinum* [?]. (6) Heredity in man: Mendelian inheritance of brachydactyly; GALTON and PEARSON laws applied to inheritance of stature, insanity, special ability, assertiveness, popularity; dangers from multiplication of unfit, and differential birth-rates favoring non-intellectuals.—*Merle C. Coulter*.

168. BREAKWELL, E. **Improvement of sweet sorghums.** Agric. Gaz. New South Wales 31: 549-551. 1920.—Summary of methods for securing improved strains.—*L. R. Waldron*.

169. BRIERLY, W. G. **Report of the division of horticulture.** Minnesota Sta. Rept. 1919: 49-54. 1919.—Outlines the work on inheritance of fruit characters, on sterility in fruits, on breeding for hardiness, and on breeding and selection of vegetables.—*H. K. Hayes*.

170. BURNS, W. **Some aspects of plant genetics.** Agric. Jour. India 15: 250-281. 1920.

171. CARROLL, MITCHEL. **An extra dyad and an extra tetrad in the spermatogenesis of *Camnula pellucida* (Orthoptera); numerical variations in the chromosome complex within the individual.** Jour. Morph. 34: 375-455. 14 pl. Sept. 20, 1920.—Ten specimens of *Camnula pellucida*, an orthopteran of the family Acrididae, were used in this investigation. Of these, five were seemingly unique in their cytological phenomena. Conjugation during maturation of a homologous pair of supernumerary chromosomes and the occurrence of "indisputable instances" of definite numerical variations within the individual in germinal chromosome complexes in non-pathological tissue are the main things considered in the paper.—The normal constituents of the complex are constant in number, and the aberrant condition is due to the presence of a varying number of supernumeraries in different cells within an individual. This variation is not constant for the gonad, but is constant for the cyst, and probably constant for the follicle until after the first spermatocyte mitosis.—The supernumeraries are all homologous in size, form, and behavior, and are apparently genetically related. Within one individual the extra element may be absent in some complexes, unpaired in some, paired in others, and present in triplicate in still others. If unpaired, it divides in only one division, usually the second. It is a matter of chance as to whether or not it goes with the accessory chromosomes. If the supernumerary is paired it behaves as any ordinary chromosome. If present in triplicate, two of the elements synapse and behave

like an ordinary chromosome, while the other behaves in the manner described for the unpaired condition. Three cases of nondisjunction were observed. In two instances it was a matter of the non-disjunction of the dyads of the supernumerary tetrad in the first maturation division. The third is a "case of either maturational equational non-disjunction or a peculiar type of reductional non-disjunction of the chromatids of the extra tetrad."—The occurrence and behavior of the supernumeraries without non-disjunction make it possible to have six kinds of spermatozoa; and should non-disjunction take place, two extra classes are possible. Since non-disjunction occurs, it must duplicate a whole or a part of one of the elements of a normal complex. It is obvious that the behavior of the supernumeraries must influence the Mendelian ratios in any system of allelomorphs which may be carried by them, since certain loci may exist in a double, treble, quadruple, or quintuple condition. These various valences may be present in different germ cells of the same individual.—*Mary T. Harman.*

172. CASTLE, W. E. Whitman and Riddle on orthogenetic evolution in pigeons. *Amer. Nat.* 54: 188-192. Mar.-Apr., 1920.—A critical but appreciative review of this monumental work. Whitman believed his experiments to prove that Mendelism was relatively limited in its application, but CASTLE shows that the results may be interpreted in conformity with present Mendelian theory.—*L. J. Cole.*

173. CORRENS, C. Pathologie und Vererbung bei Pflanzen und einige Schlüsse daraus für die vergleichende Pathologie. [Pathology and inheritance in plants and a conclusion derived therefrom for comparative pathology.] *Mediz. Klinik.* 16: 354-359. April, 1920.

174. CORRENS, C. Eine geglückte Verschiebung des Geschlechtsverhältnisses. *Botanische Versuche zur Frage nach der Entstehung des Geschlechts.* [A successful modification of the sex-ratio. Botanical researches on the question of the origin of sex.] *Natur u. Technik* 2: 65-71. 2 fig. 1920.

175. COULTER, M. C. [Rev. of: CASTLE, W. E. Piebald rats and the theory of genes. *Proc. Nation. Acad. Sci. [U. S.]* 5: 126-130. 1 fig. April, 1919.] [See *Bot. Absts.* 3, Entry 235.] *Bot. Gaz.* 70: 326. Oct., 1920.

176. CROZIER, W. J. The intensity of assortive pairing in *Chromodoris*. *Amer. Nat.* 54: 182-184. 2 fig. 1920.—This article is an additional note concerning a report published by CROZIER in *Journal of Experimental Zoology* in 1918 [See *Bot. Absts.* 1, Entry 1472] in which he shows that in the pairing of *Chromodoris* there is a "considerable degree of assortive conjugation with respect to size." In that report regression lines showing mean lengths of mates pairing with individuals of a given length class were based on "artificial" measurements; that is, the soft bodies were somewhat flattened and accordingly lengthened by the process by which they were measured. In this report the relationship between the "artificial" and normal measurements of 74 individuals is established, and the regression plots are revised in terms of the normal lengths. "The apparent intensity of homogamy in *Chromodoris* is but little affected, if anything perhaps slightly improved, by the reduction of the original figures to the natural scale."—*Sylvia L. Parker.*

177. DAVENPORT, C. B. Heredity of twin births. *Proc. Soc. Exp. Biol. Med.* 17: 75-77. 1920.—The incidence of twin births in the general population is about 1 per cent, but in certain families it rises to as high as 15 per cent, indicating that the tendency to twin production is an hereditary trait. Only biocular twinning is considered in the present communication, and only such matings are selected for analysis as have produced at least two pairs of twins. In such cases the immediate relatives—parents, brothers, and sisters,—are found to produce twins from four to eight times as frequently as does the population at large. This is about equally true for relatives on the father's side and on the mother's side, which shows that the male exerts an influence on biocular twin production commensurate with that of the female. In explanation of the nature of this influence of the male, it is pointed out that

while there is evidence that double ovulation is relatively common, the probability that viable twins will be produced is dependent upon the chance that both ova will be fertilized and that both will be free from lethal factors. These prerequisites are dependent as much upon the sperm as upon the egg and it is known that fecundity and the presence or absence of lethal factors are hereditary traits.—*C. H. Danforth.*

178. DAVIS, BRADLEY M. [REV. OF GAGER, C. STUART. *Heredity and evolution in plants.* 14 × 20 cm., xi + 265 p., 113 fig. P. Blakiston's Son & Co.: Philadelphia, 1920.] *Science* 52: 410. Oct. 29, 1920. [See Bot. Absts. 6, Entry 1672.]

179. DEMBOWSKI, JAN. *Das Kontinuitätsprinzip und seine Bedeutung in der Biologie.* [The principle of continuity and its significance in biology.] Vortr. u. Aufsätze ü. Entwicklungsmech. Org. 21. 132 p. 1919.

180. DEXTER, JOHN S. *Albino vertebrates.* *Science* 52: 130-131. Aug. 6, 1920.—The author makes note of a pure albino grackle (*Quiscalus quiscula aeneus*), two albino specimens of Richardson's spermophile (*Citellus richardsoni*), and a very light brown albinistic crow.—*Sewall Wright.*

181. [DIENER, RICHARD.] *The law of hybridizing discovered by Richard Diener.* 20 × 26 cm., 15 p., 8 fig. Richard Diener, Kentfield, California. [1920.]—Author claims to have made the following discoveries: (1) When parents are alike in size, the size of about 12 per cent of the offspring in the F₁ will be exactly double that of either parent, while the remaining 88 per cent will range in size between the size of the individual parents and their sum. (2) When parents differ markedly in size, the offspring will be smaller than either parent if the smaller parent is the mother, and very little larger than the larger parent if the latter is the mother. (3) The pollen-bearing parent is always the dominating factor in changes of form and color. (4) In attempting to derive new colors always use a white flower as the pollen parent "to break up the colors." (5) Among fowls, if two individuals are mated and the female offspring are mated back to the male parent, about one-third of the offspring of this second cross will be double the size of the animals originally mated. Basis of these generalizations are not specifically set forth.—*G. H. Shull.*

182. DREYER, TH. F. *A suggested mechanism for the inheritance of acquired characters.* *South African Jour. Sci.* 15: 272-277. 1917.—Author attempts to show that observed facts supporting WEISMANN'S theory are meager—that acceptance of theory by younger generation is partly a matter of sentiment. The character and properties of chromatin, lymph, and linin are reviewed. The linin being divided equally at cell division is considered as hereditary material on a par with the chromatin. A metabolic-products theory of heredity assumes the egg yolk to be specific for species, and assumes that it is a linin compound formed from radicals of the various tissues of the body. Reactions occur in different portions, so that it is not homogeneous; segmentation can thus split off different combinations of radicals which are built up into different tissues. Environmental factors may cause some of these radicals in the tissues to change so that the new yolk formed from the tissue radicals will contain new radicals from the altered tissues. Thus acquired characters could be reproduced in the next generation in the absence of the causative stimulus.—*J. L. Collins.*

183. DUERDEN, J. E. *Parallel mutations in the ostrich.* *Science* 52: 165-168. Aug. 20, 1920.—Ostriches are degenerate in some respects, but highly specialized in others. The North African Ostrich (*Struthio camelus*) and the South African (*S. australis*) differ in well-marked characters, at least one of which (feathering of head) is believed to be a simple Mendelian character. In other respects they are similar, and the author believes parallel evolutionary changes are in progress in them. The similarity in this respect is attributed to parallel mutations in germ-plasms of common origin. The suggestion is made that while the majority of factors are static, some may be increasing in potency while others are dwindling.—*L. J. Cole.*

184. DUNN, L. C. **Independent genes in mice.** *Genetics* 5: 344-361. May, 1920.—Author tests for linkage of certain color factors in mice and finds that the following relationships exist: Pink-eye and piebald spotting are independent; pink-eye and non-agouti are independent; black-eyed white spotting and piebald spotting are independent; black-eyed white spotting and agouti are independent; black-eyed white spotting and pink-eye are independent; piebald spotting and non-agouti, give indications of slight linkage, 46.23 ± 1.2 per cent, "of doubtful significance."—Thus four independent groups of genes are established for mice with a possibility of a fifth. Two other groups are considered as possibilities from the data of other investigators.—*C. C. Little.*

185. DUNN, L. C. **Linkage in mice and rats.** *Genetics* 5: 325-343. May, 1920.—Reviews established cases of linkage in mice and rats; albinism, pink-eye and red-eye in rats; albinism and pink-eye in mice.—On basis of extensive experiments, cross-overs of 14.5 per cent between genes for albinism and pink-eye in mice. Crossing over occurs in both sexes, in males 13.65 ± 3.81 per cent and in females 15.91 ± 0.466 per cent. This difference between sexes is 3.81 times its probable error. In rats linkage between albinism and red-eye results in 1.8 ± 0.54 per cent cross-overs; albinism—pink-eye cross-over = 21.1 ± 2.92 per cent. Red-eye—pink-eye cross-overs = 18.3 ± 0.38 per cent. Linear order of genes is indicated. Males in latter cross show 15.56 ± 0.538 per cent cross-overs, females, 20.46 ± 0.525 per cent. This difference is 6.51 times its probable error. These sex distinctions are probably due to sexual differences not yet discovered, in either structure or functioning of chromatin.—*C. C. Little.*

186. EBSTEIN, E. **Zur Frage des Vorkommens von Kretinen und Albinos in Lerbach im Harz.** [On the occurrence of cretins and albinos in Lerbach in the Harz.] *Die Naturwissenschaften* 6: 562-565. 1918.—In *Die Harzreise*, HEINE notes presence in Lerbach of cretins (*dumme Kropfleute*) and albinos (*weisse Mohren*). The consequent ill-repute of Lerbach has clung to it until present times. From medical literature and correspondence author finds that cretins existed in Lerbach at the time of HEINE's excursion in the Harz (1824), but that none have been known since 1830. Later lay references to cretinism are shown to be essentially repetitions of HEINE's statement without examination of facts. Author finds that at least two albinos lived in Lerbach in 1824, and that nine cases in three families exist at present time. Attention is called to erroneous confusion of cretinism and albinism as manifestations of same condition, and distinctions are drawn between cretinism and simple dwarf and goitrous cases. Diminution in cretinism is ascribed to failure of extreme cases to reproduce, and industrial development of Lerbach district leading to improvement in social and hygienic conditions, and introduction of fresh blood lines. Probable sources of HEINE's information are discussed, and a geological description of Lerbach district is included.—*R. E. Clausen.*

187. EDDY, W. H., H. LAKE AND A. B. LYMAN. **Report of committee examining Minnesota State Fruit-breeding Farm.** *Minnesota Hortic.* 48: 36, 37. 1920.—Gives a brief résumé of the most important work carried on at the farm.—*H. K. Hayes.*

188. ELDERTON, ETHEL M. **Life-history albums.** *Biometrika* 12: 373-374. Nov., 1919.—This is a brief discussion of the relative merits of GALTON's and TAYLOR's family history albums, both from the point of view of the people throughout the country who may be induced to fill out the records, and of the statistical workers who will use the completed records in solving problems in heredity and eugenics. The Personal and Family History Register, compiled by Dr. TAYLOR places, author thinks, more emphasis than is justifiable on environment as a factor in improving the race, and gives too much space to information about direct ancestors, leaving none for collaterals, while cousins are as closely related to one another as grandparents to grandchildren, and data about them would be much more accurate and easily obtained. Author feels that both Dr. TAYLOR's Register and GALTON's Life History Album are too bulky and that the concise "Records of Family Faculties" issued by GALTON in 1884 would very well meet the needs of the statistical worker and should be reissued.—*Sylvia L. Parker.*

189. FISCHEL, ALFRED. Ursachen tierischer Farbkleidung. [Causes of animal coat color.] Arch. Entwicklungsmech. Org. 46: 202-209. 1920.

190. FISCHER, H. Pflanzenmetamorphose und Abstammungslehre. [Plant metamorphosis and evolution.] Die Naturwissenschaften 8: 268-271. 1920.—General discussion of evolution of plant organs and structures, with examples of problems and interpretations of plant metamorphosis. Series may be constructed which show orthogenetic trend, but this is not result of inheritance of acquired characters. Causes of orthogenesis are unknown, but can be only partially environmental. Evolution is not always in direction of utility, but may lead to extinction of some lines of descent. Changes resulting from alteration of living conditions are only certainly known as consequence of domestication, and they have no utility in preservation of species.—*R. E. Clausen.*

191. FISHER, R. A. The correlation between relatives on the supposition of Mendelian inheritance. Trans. Roy. Soc. Edinburgh 52: 399-433. 4 fig. 1919.—Derivation of formulae for correlation between direct and collateral relatives for characters determined by Mendelian factors, making allowance for different degrees of dominance, for assortative mating, for multiple allelomorphism, and for coupling. By means of fraternal correlation influence of dominance is distinguished from environmental causes of variability. Best available figures for human measurements show little or no indication of non-genetic causes. Marital correlation is probably genetic, not somatic. Hypothesis of cumulative Mendelian factors fits facts very accurately.—*John Rice Miner.*

192. FREEMAN, GEO, F. A progress report on cotton breeding at the Sultanic Agricultural Society. Sultanic Agric. Soc. Bull. 3. 16 p. 1920.—After discussing factors to be considered in breeding work with cotton, author outlines plan followed by him in Egypt, dealing with selection of mother plants, handling of pedigree-plant plots and increase plots, study of vegetative characters, flowering curves, yield and lint characters.—*T. H. Kearney.*

193. GALLAUD, M. Une lignée de Giroflées à anomalies multiples et héréditaires. [A line of wall flowers with multiple hereditary anomalies.] Compt. Rend. Acad. Sci. 171: 47-49. July, 1920.

194. GASSUL, R. Nachtrag zu meiner Mitteilung über "Eine durch Generationen prävalierende symmetrische Fingerkontraktur." [Supplement to my contribution on a symmetrical contraction of the fingers prevailing through generations.] Deutsch. Med. Wochenschr. 44: 1450. 1918.—The original paper (Bot. Absts. 5, Entry 377) had neglected to indicate the relationships of members of the family in which a form of congenital finger contractions was reported. It is now possible to present a chart of the family tree from which it appears that the peculiarity may behave as a (dominant) Mendelian trait.—*C. H. Danforth.*

195. GOODALE, H. D. Practical results from studies on egg production. Massachusetts Sta. Bull. 191: 97-104. 1 fig. 1919.—Paper is divided into three sections: I. Inbreeding. II. Is the influence of the male or of the female the more important? III. The exclusion of parasites.—I. A small number of data are presented which show that both inbreeding and outbreeding may either succeed or fail. The criterion of judgment on inbreeding must be the results in each individual case.—II. Author states that "the view that high fecundity does not descend from mother to daughter but does descend from mother to son, or from father to both sons and daughters is now generally accepted." Reports that "an experiment was made in which the male from a low line (breed not stated) was mated with several high producers belonging to a high line and at the same time to several low producers." "The offspring of the high producers averaged 49.2 winter eggs against an average of the mothers and their sisters of 52.5 eggs. Nearly all were high producers. On the other hand, the offspring of the poor layers averaged only 11.6 winter eggs. In this experiment high production clearly descended from mothers to daughters. . . . In still another experiment a male belonging to a low line was mated to a female belonging to another low line. Most of the offspring

were *high* producers. . . . These experiments show that we are dealing with a situation that is complicated in many ways." III. Author points out necessity of control of all parasites in studying the inheritance of fecundity and describes "the quarantine method" of rearing chicks.—W. A. Lippincott.

196. GOODALE, H. D. Is the inheritance of egg production an insoluble problem? Jour. Amer. Assoc. Instr. and Invest. Poultry Husb. 5: 73, 74. 1919.—Author points out that while improved egg production through selection is a demonstrated fact, the laws of the inheritance of egg production have not been established. The latter present a complex problem because egg production is a complex character made up of several subsidiary characters, the inheritance of each of which must be determined in advance. Five groups of difficulties in the way of solving the problem of the inheritance of egg production are suggested in the expressed hope that means of meeting them may be devised. These center around (1) the purity of stock, it being unlikely that stock pure for any of the hereditary factors concerned in egg production is in existence; (2) the need for larger numbers than may usually be secured from a single pair; (3) the character is expressed in one sex only, making it necessary to judge the genetic composition of males by their daughters; (4) the character is very sensitive to environmental differences which are difficult to avoid; and (5) the presence of insidious but unrecognized disease in the experimental flock, and the problems of disease resistance.—W. A. Lippincott.

197. GOWEN, JOHN W. Studies in milk secretion, V. On the variations and correlations of milk secretion with age. Genetics 5: 111-188. 9 fig. Mar., 1920.—A thorough biometric analysis of milk production in a single herd of Jersey cattle, involving 1741 eight-month lactation records. The mean and standard deviation are given for each age, together with the other constants necessary for fitting each distribution with the approximate skew curve. It is pointed out that there is a sufficiently close approach to the normal curve to justify use of the latter in many cases. Milk yield is found to rise to a maximum at 7.2 years, slowly falling thereafter, the whole curve being fitted best by a logarithmic function. The variability at different ages rises and falls in a somewhat similar curve which is fitted with a cubic parabola. The correlation between the yields at any two ages is found to average +0.54, there being little difference between the value for successive lactations and lactations more widely separated in time. The correlations between the yield in one lactation and the total in various combinations of lactations were also found, that between the first and four following, for example, being +0.65, and that between the first four and the fifth being +0.69. Regression formulae are given for calculating the most probable yield in a given year or group of years on the basis of a single lactation. The use of these formulae in culling a herd is discussed.—Sewall Wright.

198. GOWEN, JOHN W. Studies in milk secretion. VI. On the variations and correlations of butter-fat percentage with age in Jersey cattle. Genetics 5: 249-324. 8 fig. May, 1920.—The material for the study is taken from 1713 eight-months records of pure-bred Jersey cows, made in one herd under uniform conditions and management. Correlation coefficients and observed and theoretical means indicate the highest percentage butter-fat with the first lactation period, and a slight decline in percentage butter-fat with each additional lactation period. The standard deviation and the coefficient of variation for the butter-fat percentage for different ages—or succeeding lactation periods—remained approximately the same. The percentage fat for any one lactation period of a cow is an accurate indication of the butter-fat percentage to be expected in future lactation periods.—The difference for the correlation coefficients for one lactation's butter-fat percentage with that of another lactation, and for one lactation's butter-fat percentage with the butter-fat percentage over four lactation periods, gives a means of measuring the effect of environmental changes on the butter-fat percentage. It was found that the internal mechanism of the cow, which is probably hereditary, exercises six times the effect, in controlling butter-fat percentages, that the environmental changes have. The factors that control the butter-fat percentages have the same relative strength throughout the life of the cow to the exclusion of any group of factors acting for short periods.—R. R. Graves.

199. GRIER, N. M. Variation and distribution of leaves in *Sassafras*. *Biometrika* 12: 372-373. Nov., 1919.—Three kinds of leaves are found on *Sassafras* trees—three-lobed, two-lobed, and single-lobed. Single-lobed leaves constitute about two-thirds of the foliage and are found at the ends of the branches. Two- and three-lobed leaves are found in shaded positions on the tree and can be produced on terminal branches by shading.—*Karl Sax*.

200. GROSSER, OTTO. Die Lehre vom spezifischen Eiweiss und die Morphologie, mit besonderer Anwendung auf Vererbungsfragen und den Bau der Plazenta. [The doctrine of specific proteins and morphology, with special application to questions of heredity and the structure of the placenta.] *Anat. Anzeiger* 53: 49-57. May, 1920.—Not alone chemical structure but also living structure is significant in determining morphology. Expression "organ-forming substances" might well be replaced by "organ-forming germinal regions" (His, 1874). Inheritance may be assumed to depend on specificity of proteins. Single molecule is not to be regarded as *anlage* of organ, but only in interrelation with other molecules. Placenta excludes specific proteins of mother until they have been digested, whereby their specificity is lost. Mother is thus prevented from exercising larger influence in heredity.—*A. Franklin Shull*.

201. HAGEDOORN, A. L., EN A. C. HAGEDOORN-VAN VORSTHEUVEL LA BRAND. Het overgeerfde moment bij bacterieele ziekten. [The inherited factor in bacterial infection.] *Nederlandsch Tijdschr. voor Geneeskunde* 63: 179-182. 1919.—Experimenting with mice for the study of inheritance of body-weight, authors crossed a small Japanese mouse with a strain of great white mice. These experiments had resulted in a great collection of F_1 and F_2 animals (some thousands), as also of back-crosses between F_1 's and white or Japanese mice. In the spring of 1919 an epidemic disease broke out and made great ravages among the mice colonies. In the blood of 5 animals a specific *Staphylococcus* could be observed. All pure Japanese animals (60) died; white mice, inhabiting the same cages, survived. A great difference in susceptibility for this *Staphylococcus*-disease could be observed. In the other cages, this susceptibility was shown to be a Mendelian character and a recessive. The F_1 -animals survived; from the F_2 -animals 91 survived and 34 died (expected 93.75:31.25); back-crosses of F_1 's with Japanese mice gave 32 dead animals and 25 immunes; out of back-crosses between F_1 's and white mice only one of 51 animals died. These numerical relations make sure that the immunity against the *Staphylococcus*-infection is a dominant Mendelian factor according to the monohybrid scheme, susceptibility being the recessive. The first case of a simple inheritance of disease-resistance.—*M. J. Sirks*.

202. HALDANE, J. B. S. Note on a case of linkage in *Paratettix*. *Jour. Genetics* 10: 47-51. July, 1920.—NABOURS (*Jour. Genetics* 3: and 7:) showed that the various color patterns in the grouse-locust, *Paratettix texanus*, are due to a series of Mendelian factors which are multiple allelomorphs or else very intensely linked, plus a factor Θ which is allelomorphic to its absence. A re-examination of his data has demonstrated that in males the factor Θ actually shows a crossover value of about 24 per cent with any of the other factors, and in females a crossover value of about 46 per cent. The factor Θ thus exhibits a fairly marked linkage with all the others in males, and a very slight linkage in females. Slight differences in the crossover values appear between Θ and certain of the other pairs. If the so-called multiple allelomorphs are really closely linked factors, then their presence in the heterozygous condition may increase the linkage, since heterozygous factors have been shown to cause such increases in *Drosophila*. The type of linkage in *Paratettix* seems to be intermediate between the type found in *Drosophila* and *Bombyx* where no crossing over occurs in the digametic sex, and the type in plants and mammals where linkage is equal in the two sexes.—*H. H. Plough*.

203. HARALSON, C. Minnesota State Fruitbreeding Farm in 1919. *Minnesota Hortic.* 43: 34, 35. 1920.—Reports briefly on progress in testing new varieties.—*H. K. Hayes*.

204. HARRIS, J. ARTHUR. **Practical universality of field heterogeneity as a factor influencing plot yields.** Jour. Agric. Res. 19: 279-314. 10 fig. July 1, 1920.—Analysis is made of actual yields of plot tests reported by investigators for various root, hay, grain, and fruit crops. All fields were found to be heterogeneous, though they had been carefully selected for yield tests because of apparent uniformity. Soil heterogeneity is shown to have a real physical and chemical basis.—Author concludes that it is practically impossible to secure fields suitable for a direct comparison of yields. This fact emphasizes need of greater care in agronomic technique and of more extensive use of statistical method in analysis of the data from plot trials.—See also Bot. Absts. 6, Entry 480.—C. M. Woodworth.

205. HARTLEY, C. P. **Better seed corn.** U. S. Dept. Agric. Farmers' Bull. 1175. 14 p., 9 fig. 1920.—It is stated that low yields due to poor seed can be prevented by selecting seed corn (maize) in the field in the fall, and instructions are given for gathering, storing, grading, and testing the selected ears. Four experiments are summarized briefly as follows: (1) Varieties that produce most in some states are among the poorest in others. (2) Seed ears from the highest yielding rows of ear-to-row breeding plats have repeatedly produced better than ears taken from poorer rows. (3) Well-preserved seed was found to produce higher yields than seed injured by exposure, although both kinds germinated equally well. The difference between the two kinds is accentuated when they are grown in fertile soil. (4) Diseased ears or apparently healthy ears from diseased stalks give lower yields than disease-free ears from normal stalks.—J. H. Kempton.

206. HEAL, JOHN. **Hippeastrum (Amaryllis).** Gard. Chron. 68: 60. July 31, 1920.—Recounts the unsatisfactory results of crossing *Hippeastrum pardinum* with other *Hippeastrums*. Credits *H. Leopoldii* with more influence than any other *Hippeastrum* in production of best forms.—J. Marion Shull.

207. HEILBRUNN, L. V. **Studies in artificial parthenogenesis. III. Cortical change and the initiation of maturation in the egg of Cumingia.** Biol. Bull. 38: 317-339. May, 1920.—When the egg of *Cumingia* is shed into sea-water, the first maturation spindle has formed, but no polar bodies are thrown off unless the egg is fertilized or treated with the proper reagents. The immature unfertilized egg is surrounded by a stiff vitelline membrane which tightly encloses the fluid cytoplasm and effectively prevents the throwing off of polar bodies; it is only when the egg is released from this restraint that maturation can proceed. Such a release from restraint can be accomplished in three ways: by membrane elevation, by membrane swelling, and by rupture of the membrane. Substances which themselves have low surface tension produce a lowered surface tension of the membrane, and this results in its elevation from the egg surface. Acids, alkalis, and certain salt solutions cause the vitelline membrane to swell. The membrane may be removed from the egg by shaking, or it may be caused to rupture by immersion in dilute sea-water. Maturation in *Cumingia* is not dependent upon an increase in oxidation. Cortical change in *Cumingia* produces no increase in permeability either to dissolved substances or to water.—Bertram G. Smith.

208. HEINRICHER, E. **Ein Versuch Samen, allenfalls Pflanzen, aus der Kreuzung einer Laubholzmistel mit der Tannenmistel zu gewinnen.** [An attempt to secure seeds, perhaps plants, from the cross between the mistletoe of deciduous trees with that of the Coniferae.] Ber. Deutsch. Bot. Gesell. 37: 392-398. Dec., 1919.

209. HENNING, HANS. **Mnemelehre oder Tierpsychologie?** [The mneme theory or animal psychology?] Biol. Zentralbl. 39: 187-192. April, 1919.—Controversial article in which rather incidentally author denies identity of "individual memory" and heredity.—A. Franklin Shull.

210. HOOPER, J. J. **Inheritance of Jersey colors.** Jour. Dairy Sci. 2: 290-292. 1919.—This paper deals with the inheritance of self vs. broken color (white spotting), tongue color and switch color, in Jersey cattle. The data are largely taken from the American Jersey herd books. Broken color mated to broken color was found to give 194 broken color to 15 self

color; broken-colored bull to self-colored cow gave 179 broken color to 257 self color; and self colored bulls and cows gave 425 self color to 75 broken color. Citations of the progeny of certain bulls are given.—Mating white-tongue parents gave 71 per cent white-tongued. Mating parents of white switch gave 91 per cent white switch.—The suggestion is made, based on the fact that roan had disappeared from the Station herd, that the old roan Jersey is due to a dominant factor.—*John W. Gowen.*

211. HOSKING, A. *Hybrid Calceolarias*. Gard. Chron. 68: 47, 61. 2 fig. July 24, 31, 1920.—A list of hybrid Calceolarias with brief descriptions and statement of parentage.—*J. Marion Shull.*

212. JARAMILLO, P. J., AND F. J. CHITTENDEN. On double stocks. Jour. Roy. Hort. Soc. 44: 74-82. 2 pl. 1919.—Correlation shown between double flowering and vigor of plant at time of pricking out, and confirming the observations of Miss SAUNDERS to that effect.—*J. Marion Shull.*

213. KATHARINER, L. Die Entwicklungsgeschichte der digenetischen Trematoden und die Kontinuität des Keimplasmas. [The ontogeny of the digenetic trematodes and the continuity of the germ-plasm.] Zool. Anzeig. 51: 220-223. Aug., 1920.

214. KIESSLING, L. Über eine Mutation in einer reinen Linie von *Hordeum distichum* L. [On a mutation in a pure line of *Hordeum distichum* L.] Zeitschr. indukt. Abstamm. Vererb. 19: 145-159. June, 1918.—In the ninth generation of a pure line of *Hordeum distichum* L. a mutation occurred which is strikingly different from the parent form in many morphological and physiological characters. In appearance the mutant is somewhat larger than the unmutated plants and is lighter green in color, due to a reduction in chlorophyll. When the mutant was crossed with the parent form, all differences were inherited as if due to a single point-mutation. The author entertains the hypothesis that the mutation is concerned primarily with a reduction in chlorophyll, and that the morphological variations are merely expressions of the plant's readjustment to the decreased chlorophyll content.—*W. H. Eyster.*

215. KRONACHER, C. Die deutsche Schweinezucht und Haltung nach dem Kriege. [German swine breeding and maintenance after the war.] Flugschr. Deutsch. Ges. Züchtungskunde 41: 1-47. 1918.—The author emphasizes the importance to Germany of complete independence from foreign countries in regard to food supply and the consequent importance of raising the swine population to its prewar level. The problem is primarily one of feeding rather than of breeding, and the first consideration is the basing of German swine husbandry wholly on home-grown feeds. As regards breeding, most stress should be placed on constitutional vigor, the extreme development of early maturity, and ease of fattening having proved deleterious in this respect.—*Sewall Wright.*

216. KRONACHER, C. Allgemeine Tierzucht. Ein Lehr- und Handbuch für Studierende und Züchter. Vierte Abteilung (Abschnitt VI des Gesamtwerkes): Die Züchtung. [General animal breeding. A text and handbook for students and breeders. 4th part (Section VI of the complete work): Breeding. 8 vo. 357 p. Paul Parey: Berlin, 1919.—The first chapter, 210 pages, deals comprehensively with selection, including discussion of systems of mating,—cross-breeding, pure-breeding, inbreeding, etc.,—considerations in the judgment of pedigree, performance, and conformation, discussion of fancy points, technical methods of judging, special considerations in judging breeding stock, etc.—The second chapter, 137 pages, deals with the physiology of reproduction in the domestic animals.—*Sewall Wright.*

217. LEAKE, H. MARTIN. Report on the maintenance and improvement of the quality of Egyptian cotton and the increase of its yield. Ministry Agriculture Egypt. Cairo. 33 p. 1920.—Author was invited by Egyptian Ministry of Agriculture to make "recommendations with a view to the maintenance and improvement of the quality of Egyptian cotton and the increase of its yield." His report deals with such matters as relation of commercial supply

and demand for particular types of cotton, to work of breeder and grower; impurity of commercial varieties in Egypt due to crossing and seed mixture; and relation of yield and quality to physical environment. He outlines a program of economic, botanical, and agricultural investigations looking to improvement of crop with especial emphasis upon breeding and increase of pure lines to replace present mixed commercial stocks. He discusses complications caused by uncontrolled introduction of new varieties.—*T. H. Kearney.*

218. LÉCAILLON, A. Sur la reproduction et le développement des bivoltins accidentels et de la première génération qui en dérive, chez le *Bombyx du Mûrier*. [On the production and development of accidental bivoltins and the first generation derived from them in the silkworm (*Bombyx mori*). *Compt. Rend. Acad. Sci.* 168: 366-368. 1919.]

219. LIPPINCOTT, W. A. Pedigreeing poultry. *Kansas Agric. Exp. Sta. Circ.* 67. 16 p., 10 fig. 1918.—Methods of pedigreeing poultry, including methods of marking breeders and offspring, trapnests, methods of pedigree hatching, chick and mating indexes, marking of eggs, flock breeding records, pedigree blanks and egg records are given.—*H. D. Goodale.*

220. LITTLE, C. C. Alternative explanations for exceptional color classes in doves and canaries. *Amer. Nat.* 54: 162-175. Mar.-Apr., 1920.—The author reviews the explanation based on partial sex-linkage and non-disjunction previously offered to account for the appearance of exceptional color classes in doves and canaries, and concludes that neither is adequate. He then advances the theory that these occasional cases may be the results of mutative changes of the recessive factors to their dominant allelomorphs. His view has no more proof in existing data than the others, but has the advantage of avoiding the immediate expectation of color classes which have not been reported. [His suggestion, however, that female doves and canaries may be homozygous for dominant sex-linked factors is contrary to all present experience.]—*L. J. Cole.*

221. LLOYD-JONES, O., AND F. A. HAYS. The influence of excessive sexual activity of male rabbits. I. On the properties of the seminal discharge. *Jour. Exp. Zool.* 25: 463-497. 1918.—The plan of the experiment as stated by the authors was "to have the male accomplish, in as rapid succession as possible, a certain number of preliminary 'services' and then to mate him once to the breeding female from which the litter was desired. The 'end services' from which litters were secured for the progeny studies were the fifth, tenth, fifteenth and twentieth, and about an equal number of first-service litters were obtained as controls. When semen studies were made, however, it was aimed to recover specimens from the first and from every fifth service thereafter; thus, in a series of twenty services, five specimens of semen would ideally be recovered for study. This ideal set of specimens from a twenty-service series was seldom obtained, however."—It was shown that excessive sexual service causes decrease in amount of ejaculated semen, decrease in number of sperm cells per cubic millimeter, decrease in the proportion of sperm that show progressive motion, decrease in their duration of motion, decrease in percentage of fertile matings, and decrease in number of young per litter.—*H. L. Ibsen.*

222. LUNDBORG, H. Arv och miljö. Befolkningspolitiska synpunkter. [Inheritance and environment. Race-political views.] *Det nya Sverige* [Stockholm], 14: 3-12. 1920.—Author holds that great crossing of races degenerates constitution and increases degradation. Crossing of races takes place in a much greater degree among the lower and poorer part of the population than among the middle classes. Author has proved by his own investigations that the lowest classes—those which are in social respect the most degenerated of the population—consist to a greater extent of individuals with other race-qualities, such as darker hair and eyes, than the great bulk of the population. The middle class has a more homogeneous composition than the poorer ones. The biological sciences are nowadays promoting a new social evolution, by which the most important matters are life values and not wealth or other material advantages. Great and richly equipped eugenical scientific institutions must be established in all civilized countries.—*K. V. Ossian Dahlgren.*

223. MAC-AULIFFE, A. MARIE ET LÉON. Influence du milieu parisien sur la race. [Influence of Parisian environment on the race.] Compt. Rend. Acad. Sci. 171: 527-529. Sept., 1920.

224. MILEWSKI, A. W. Über Torniers experimentelle Untersuchungen, über das Entstehen pathologischer Verbildungen bei Tieren, sowie weiteres über experimentelles Erzielen von monströsen Goldfischarten. [On Tornier's investigations on the origin of pathological malformations in animals as well as further consideration of the experimental attaining of monstrous goldfish species.] Arch. Entwicklungsmech. Org. 44: 472-498. 1918.

225. MILLIKEN, C. S. Some facts about citrus bud selection. California Citrograph 5: 222. May, 1920.—A popular article emphasizing "bud selection" as essential for the most profitable production of citrus fruits.—Howard B. Frost.

226. NACHTSHEIM, HANS. Crossing-over-Theorie oder Reduplikations-hypothese? [The crossing-over theory or the reduplication hypothesis?] Zeitschr. indukt. Abstamm. Vererb. 22: 127-141. 4 fig. Jan., 1920.—A critical review of Trow's modification of the BATESON-PUNNETT hypothesis of reduplication as an explanation of coupling and repulsion (linkage) (TROW, A. H., Jour. Genetics 5: 1916). Although the more recent papers were not available to the author, it is concluded that the crossing-over hypothesis, as worked out in the studies on *Drosophila*, offers a better explanation of the phenomena.—H. H. Plough.

227. NAMYSLOWSKI, B. État actuel des recherches sur les phénomènes de la sexualité des Mucorinées. [The state of researches on sexuality in the Mucorineae.] Rev. Gén. Bot. 32: 193-215. 9 fig. 1920.

228. NESS, H. [misprinted as N. Hess]. Experiences in plant hybridization. Proc. Amer. Soc. Hort. Sci. 16: 52-60. (1919) 1920.—Author calls attention to fact that much which has been written concerning plant hybridization has been largely repetition of phenomena in stock examples.—Importance of plant hybridization was early appreciated by floriculturists, and from them we have many forms of begonia, canna, gladioli, etc. Their work resulted from an attempt to supply a demand and few records have been kept; thus the scientific value of the work has been greatly lessened.—The uncertainty of positive results makes hybridization work by the individual a somewhat uncertain financial proposition, and thus is best done by a publicly supported institution.—Author has worked with two genera, *Rubus* and *Quercus*, that with *Rubus* being an Adams Fund project. Has made many crosses among which were May's dewberry (*R. villosus*) also called Austin, by the Early Harvest blackberry (*R. argutus*). In the first generation the May's was almost completely dominant, and a good population was obtained. From the reciprocal crosses he failed to obtain any progeny, neither was he successful when Early Harvest was the mother and the pollen was secured from other sources. In these experiments several attempts were made with crosses of different varieties and species of *Rubus* but without success until he used seedlings of the raspberry, *R. rubiculus*, as the maternal parent; and the influence of this parent was manifest in subsequent generations. He notes: "The most remarkable part of these phenomena appears to me to be that fertility appeared only in the most robust group of those of the F₂ generation in which the raspberry was dominant; and that having once occurred, it became invariably hereditary just as though sterility was merely a passing crisis."—His work with *Quercus* shows that "the various individuals of a species vary widely in their affinity for foreign pollen. . . . To be successful in hybridization it is necessary to search out by trial individuals having the proper affinity for the pollen to be applied. For this purpose seedlings would naturally be preferred to plants produced vegetatively."—C. E. Myers.

229. ONSLOW, H. The inheritance of wing colour in Lepidoptera. III. Melanism in *Boarmia consortaria* (var. *consobrinaria*, BKH.). Jour. Genetics 9: 339-346. 1 pl. Mar., 1920.—Melandism of *consobrinaria*, crossed with the grayish speckled type, is dominant. In

four species of Geometrids, *Tephrosia consonaria* and *T. extersaria*, *Boarmia abietaria* and *B. consortaria*, a melanic variety has appeared in south England remote from the industrial regions of the North. That melanism is common in industrial and urban districts is explained by the correlation of a greater hardiness with melanism. Natural selection, acting more drastically in the manufacturing areas "where the woods and vegetation upon which the larvae feed have been largely destroyed and elsewhere contaminated with a chemical deposit," weeds out individuals of the feebler type form, but permits melanic mutants to develop. Melanics of *B. consortaria* as well as of *T. consonaria* (var. *nigra*) seem to the author to be "earlier, stronger and larger than the type forms. Moreover, there is often a slight excess of melanics in most crosses."—The author calls attention to a curious inverse relationship between sex and the melanism of *consobrinaria* which he regards as fortuitous, though it occurs in a single inbred strain and the numbers, in at least one family, are of considerable size. This relationship appears in reciprocal crosses between the heterozygous dominant (melanic) $\times$ recessive (type): Heterozygous (melanic) $\text{♀} \times$ recessive (type) ♂ gives approximately:

$\text{♀} \text{♀}$	7 heterozygous:	9 recessive
$\text{♂} \text{♂}$	9 " :	7 "

Recessive (type) $\text{♀} \times$ heterozygous (melanic) ♂ gives: —

$\text{♀} \text{♀}$	9 heterozygous:	7 recessive
$\text{♂} \text{♂}$	7 " :	9 "

Nearly half of the recorded matings between heterozygote and recessive (6 out of 14) fall into this too symmetrical scheme [that suggests an unorthodox sex-linkage or a sex-linked lethal factor destroying 25 percent of every brood]. The numbers are small except in the following case: recessive (type) $\text{♀} \times$ heterozygous melanic ♂ , giving 64 melanic $\text{♀} \text{♀}$, 49 melanic $\text{♂} \text{♂}$; 49 type $\text{♀} \text{♀}$, 60 type $\text{♂} \text{♂}$.—*J. H. Gerould*.

230. PETCH, T. Variation in coconuts. *Trop. Agric. Ceylon* 54: 1. 1 pl. 1920.

231. PHIPPS, WILLIAM H. The law of hybridizing. *Florists' Exch.* 50: 814. Oct. 16, 1920.—A criticism of WESTON, T. A., Rev. of [DIENER, R.], The law of hybridizing, etc. [See Bot. Absts. 7, Entries 181, 248].—*G. H. Skull*.

232. POWELL, GEORGE T. Thirty years' experience in the application of bud selection in the fruit industry. *California Citrograph* 5: 344, 364-366. 4 fig. Sept., 1920.—A paper read at a meeting of California nurserymen. Over 30 years ago, the writer publicly advocated propagation from superior orchard trees. Discussion largely relates to the apple. Writer has several thousand apple trees, "practically all" propagated from carefully selected bearing trees; the apparent results are excellent, though comparative tests are not reported. The opinion is expressed that selection for resistance to cold and to disease is important.—*Howard B. Frost*.

233. PRIDHAM, J. T. Natural crossing in wheat. *Agric. Gaz. New South Wales* 31: 457-461. 2 fig. 1920.—Quotations from various authors are given, as to relative abundance of natural crosses. The author cites a few instances of natural crosses coming under his own observation and mentions one commercial variety, Marshall No. 3, an Australian wheat which originated as a natural cross.—*L. R. Waldron*.

234. PRIDHAM, J. T. The selection of promising wheat plants. *Agric. Gaz. New South Wales* 31: 548. 1920.—Suggestions to farmers for selecting plants from fields suitable for future increase.—*L. R. Waldron*.

235. REICHERT, E. T. A biochemical basis for the study of problems of taxonomy, heredity, evolution, etc., with special reference to the starches and tissues of parent-stocks and hybrid stocks and the starches and hemoglobins of varieties, species and genera. *Carnegie Inst. Washington Publ.* 270. Part 1, xi + 376 p., 34 pl., 820 fig. Part 2, vii + 377-834. 1919.—This memoir,

in two large volumes, is designated as complementary and supplementary to the author's (and BROWN'S) well-known earlier crystallographic studies of the hemoglobins, and to his work on the stereochemistry of protoplasmic processes and products as displayed through the differentiation and specificity of starches (Nos. 116 and 173, respectively, of the Carnegie Institution of Washington). Like its predecessors the present study is regarded as exploratory in character. The main thesis of the three sets of studies is that "in different organisms corresponding complex organic substances that constitute the supreme structural components of protoplasm and the major synthetic products of protoplasmic activity are not in any case absolutely identical in chemical constitution, and that each such substance may exist in countless modifications, each modification being characteristic of the form of protoplasm, the organ, the individual, the sex, the species, and the genus."—Since the molecule of such a protein as serum-albumin may have as many as 1000 million stereo-isomers, the inconceivable number of possible constitutional differences in the corresponding proteins of different individuals is obvious. The author believes that the collective evidence available today indicates that every individual is a chemical entity that differs in characteristic particulars from every other, and that differences in chemical constitution and composition can account for all the differences which serve to characterize genera, species, and individuals. Being an inert, non-living synthetic product of metabolic activity which bears no resemblance to the protoplasm that gives rise to it, starch may be used as an indicator in determining whether the products of synthesis are correspondingly modified with the stereochemical peculiarities of the protoplasm by which they are produced. REICHERT finds that such is the case. Moreover, since such differences are diagnostic, they constitute "a strictly scientific basis for the classification of plants." The present research treats mainly of the properties of parent-stocks and hybrid-stocks, and correspondingly, of heredity. The author thinks that the importance of hybridization in the genesis of species has been greatly underrated. He expresses the object of his research as follows: "In both of the preceding researches satisfactory evidence was recorded to justify the conclusion that complex organic substances exist in different stereo-isomeric forms in different organisms, and that the differences are specific in relation to genera, species, and varieties, and in general in striking accord with the accepted data of the systematist. Naturally it seemed to be a matter of the greatest fundamental importance to determine to what recognizable degrees these physico-chemical properties are transmitted from seed and pollen parents in altered or unaltered form in the hybrid; if it is possible to predict the heritability of this or that property: whether or not new physico-chemical properties appear in the hybrid; and if the phenomena of physico-chemical inheritance are not only consistent with, but also in explanation of, the data of the systematist and with the experience of the plant breeder." In connection with a discussion of the criteria of hybrids and mutants he translates a lecture of FOCKE (1881) rarely found in libraries, which summarizes under five propositions a great amount of data pertaining to hybrids and their offspring. REICHERT regards Mendelism as of value merely in explaining certain phenomena of inheritance and but one of several types of mechanisms of heredity. He uses the term "unit-character" and "unit-character phase" repeatedly but apparently not in the accepted Mendelian sense, for he says: "The term character is used throughout this research in a conventional sense to signify any property that serves to characterize any part or property of starch or plant. Inasmuch as each such property is a unit of comparison, each may appropriately and advantageously be referred to as a unit-character." What he finds regarding starch characters in hybrids when compared with those of parents may be summarized in his own words: "If starch characters are heritable they should, in order to meet theoretic requirements, exhibit peculiarities of inheritance corresponding to those observed in gross and microscopic anatomic plant characters. This deduction will be found to have ample justification in the results of this research. Herein it will be found that the starches of the hybrids frequently exhibit in histologic, polariscopic, and physico-chemic properties some degree of intermediateness between the parents, usually nearer one or the other. In any given hybrid certain of the properties may be exactly or practically exactly intermediate and other properties may be identical with the corresponding properties of one or the other parent. In many instances one or more of the characters of the hybrid, such as the relative

number and the types of compound grains, the degree of fissuration, the regularity or irregularity of the forms of the grains, the characters of the hilum, the distinctness and size of the lamellae, the polariscopic properties, the temperature or gelatinization, the aniline reactions and the qualitative and quantitative reactions with the various chemical reagents, were developed or manifested in degrees beyond the parental extremes. Moreover, peculiarities of various kinds were observed at times in the hybrid that were not apparent in either parent."

—In general he concludes that "the results of the hemoglobin and starch researches are mutually confirmatory in support of the existence of stereo-isomeric forms of complex organic substances that are specifically modified in relation to varieties, species, subgenera, and genera, and that these specificities indicate corresponding peculiarities of the protoplasm in which the substances are formed."—In Chapter VI of Volume 1, the author discusses the applications of the results of his researches under the following headings: specificity of stereo-isomerides in relation to genera, species, etc.; protoplasm a complex stereo-isomeric system; the germ-plasm a stereochemic system; protoplasmic stereochemic system applied to the explanation of the mechanism of variation, sports, fluctuations, etc.; protoplasmic stereochemic system applied to the genesis of species.—Part 2 (a separate volume), "Special, general and comparative laboratory data of the properties of the starches and of the tissues of parent-stocks and hybrid stocks," consists of the laboratory records prepared by two of the author's assistants, Dr. ELIZABETH E. CLARK, and Miss MARTHA BUNTING.—M. F. Guyer.

236. ROSENBERG, O. Weitere Untersuchungen über die Chromosomenverhältnisse in *Crepis*. [Further studies on the chromosome relations in *Crepis*.] Svensk. Bot. Tidskr. 14: 319-325. 5 fig. 1920.—In *Crepis Reuteriana* there are quite normal grains with only two (normally three) chromosomes to be found. This depends on abnormalities in the reduction division. Of *Crepis Reuteriana* ($2x = 6$) a *gigas* mutation with 12 somatic chromosomes is found, each of the three chromosome types being represented by four chromosomes. A great deal of polyploidy is now known in the genus. *Crepis biennis* and others have 42 somatic chromosomes. These species may be interpreted as 14-ploid, possessing only the same 3 types of chromosomes as we find in *Crepis virens*, but repeated 14 times.—K. V. Ossian Dahlgren.

237. RUNNSTRÖM, J. Befruktningens och fosterutvecklingens problems. [The problems of fertilization and embryology.] Vetenskap o. Bildning 30. 282 p., 109 fig. A Bonnier: Stockholm, 1920.—Contains a treatise on the origin and evolution of the cell-idea. Aims to give a comprehension of the physiology of cell-division and fertilization, illustrating chief problems of the mechanics of evolution by some examples. Last chapter treats of endocrine secretion of sex-glands, etc. Some results are new, being taken from the author's own still unfinished studies on the mechanics of evolution as exemplified in sea-urchin eggs. Working with sea-water free from K or Ca, may produce a symmetrical system perpendicular to the normal one. Author also demonstrates some experiments to eliminate the echinid rudiment which is to be found at the left side of the larva. In spite of the extirpation of this rudiment, certain symmetrical changes take place in the alimentary canal. A new mouth and a new oesophagus may be developed. The latter is often produced in a manner different from that of the normal metamorphosis. Changes of the rectum differing from normal development are also found. In some cases three quite atypical organs have been discovered: (1) A ciliated organ, that produces an excretion, in connection with the anus. (2) An outgrowth from the body, produced by cylindrical epithelium with capacity of secretion and liable to be regenerated. (3) A pocket-like formation with ciliated cells. The author considers that genes exist in sea-urchin eggs, the effects of which are normally suppressed by the great development of the echinid rudiment.—K. V. Ossian Dahlgren.

238. RUŽIČKA, VLADISLAV. Restitution und Vererbung. Experimenteller, kritischer und synthetischer Beitrag zur Frage des Determinationsproblems. [Restitution and heredity. Experimental critical and synthetic contribution to the problem of determination.] Vortr. u. Aufsätze u. Entwicklungsmech. Org. 23: 69 p. 1919.

239. SCHRADER, FRANZ. Sex determination in the white-fly (*Trialeurodes vaporariorum*). Jour. Morph. 34: 267-305. 4 pl. Sept. 20, 1920.—Other workers had discovered that virgin females of this white-fly produce only males in America, but only females in England. Author shows that number of chromosomes in American race is 22 except in pseudo-vitelline or mycetoma cells, where number is 30 or more. In female, maturation includes two divisions, and mature egg contains eleven chromosomes. If egg is unfertilized, it produces male with eleven chromosomes. In spermatogenesis reduction division is completely suppressed and spermatozoa have haploid number of chromosomes. Whether egg is fertilized or not is in some way controlled in female.—Author suggests parthenogenetic production of females (as in England) may be due to reunion of polar nucleus with egg nucleus, or to doubling of number of chromosomes at some stage. If fertilized eggs of English race produce both sexes, explanation may be that entrance of spermatozoon causes reduction of chromosomes in egg (a process omitted or neutralized in parthenogenetic egg), but some of spermatozoa do not function any further, leaving egg to develop with haploid number and produce male.—English race is supposed to have originated from American, perhaps by mutation. Occurrence of some males in England may be result of importation from America.—A. Franklin Shull.

240. SHAMEL, A. D., L. B. SCOTT, C. S. POMEROY, and C. L. DYER. Citrus-fruit improvement: a study of bud variation in the Eureka lemon. U. S. Dept. Agric. Bull. 813. 88 p. 18 tables, 22 fig. June, 1920.—The methods employed in this investigation have been, in general, like those used in the three previously reported studies of orange and grapefruit varieties (see Bot. Absts. 2, Entries 707, 708, 709). Selected plots in Eureka lemon orchards including 252 trees altogether, have furnished detailed records of yield, grade, etc., while coöperative arrangements have given individual records for about 14,000 trees. Extensive statistical data, covering about 6 years (1911-1917) are presented.—Eight strains of Eureka lemon are described, all of which "have been traced to individual fruit or limb variations in trees growing under normal conditions," and have been experimentally propagated by budding. These strains differ in many characters, such as habit of growth, size and shape of leaves, productiveness, shape of fruit, thickness of rind, and season of production. The Eureka strain, which is that most typical of the variety as usually grown, is the only type desirable for commercial lemon production. Trees of certain other types, such as the Shade-tree strain, are numerous in some orchards, evidently because of the former practice of using as budwood the vigorous non-bearing shoots, which are especially numerous with these strains.—The authors advise that all buds for propagation be taken from shoots bearing normal fruits, and that these bud sticks be cut only from superior performance-record trees; also, that orchard trees of inferior strains be top-worked or replaced.—Howard B. Frost.

241. SHAMEL, A. D., L. B. SCOTT, C. S. POMEROY, and C. L. DYER. Citrus-fruit improvement: a study of bud variation in the Lisbon lemon. U. S. Dept. Agric. Bull. 815. 70 p., 13 tables, 14 fig. June, 1920.—The work with the Lisbon lemon closely paralleled that with the Eureka lemon (see Bot. Absts. 7, Entry 240) in methods, general results, and conclusions. Detailed records were secured for 128 trees in selected plots, and coöperative records for about 13,000 trees. Five definite strains are described in detail; others have been observed but not thoroughly studied. Of these five strains, the Lisbon strain, representing "the established ideal for the Lisbon variety," is the most productive. The Open strain, though less hardy and productive, has an advantage in its tendency to produce fruit throughout the year, resembling the Eureka strain of the Eureka variety in this respect. In some orchards the Open strain predominates, and in others the Lisbon strain. The other strains are markedly inferior.—Howard B. Frost.

242. STARK, MARY B. A benign tumor that is hereditary in *Drosophila*. Proc. Nation. Acad. Sci. [U. S.] 5: 573-580. 5 fig. Dec., 1919.—A new benign tumor appeared in a stock of *Drosophila*. By inbreeding, a strain true to the tumor character was established. One gene for the tumor is situated in the third chromosome close to dichaete. Extraction of the

tumor character in only five per cent of the flies shows other genes also involved. These are under investigation. 780 larvae show from one to three tumors situated in 6, 8, 9, 10, 11, 12, 13 or 14th segments. Metastases may or may not be present. Tumor may also be in head or may replace wing or other appendages. Tumor cells are rounded or polygonal and contain pigment. Pigment increases with age. Cells giving rise to tumor are originally hypodermal. Tumor in adult fly is permeated with black pigment. When tumor develops in abdomen, no shortening of life in fly results. Tumor was inoculated in 40 larvae; only 2 survived; both grew tumor and were sterile females.—C. C. Little.

243. TÄCKHOLM, G. On the cytology of the genus *Rosa*. A preliminary note. Svensk. Bot. Tidskr. 14: 300-311. 3 fig. 1920.—Very brief summary of author's chief results. About 300 bushes, representing approximately 230 different forms, are investigated. The fundamental haploid chromosome number in *Rosa* is 7. There are two very different groups of species: (1) the very polymorphous *canina*-section (in the widest sense), and (2) all other sections. The latter group have only gemini (7, 14, or 21) in the diakinesis; the former possess both paired chromosomes and single ones. The following table gives the observed numbers:

TYPE	BIVALENTS	SINGLES	SOMATIC	2x-PLOIDY
1	7	—	14	Diploid
2	14	—	28	Tetraploid
3	21	—	42	Hexaploid
4	7	7	21	Triploid
5	7	14	28	Tetraploid
6	7	21	35	Pentaploid
7	7	28	42	Hexaploid
8	14	7	35	Pentaploid
9	14	14	42	Hexaploid
10	Variable	Variable	32-36	Anorthoploid

The roses of types 1-3 have only sexual reproduction. Some of this species have varieties with different chromosome numbers (haploid number 7 and 14; 14 and 21). Triploid roses (type 4) may be hybrids between types 1 and 2. Type 8 may be interpreted as the result of a cross between types 2 and 3. The reduction division in the anthers is quite in accordance with the *Drosera*-hybrid scheme of ROSENBERG. The immense number of forms belonging to the section *Caninae* (in the widest sense) are distributed in the types 5-7. The reduction divisions of the *Caninae* in the anthers and the ovules are carried out in a quite different manner. In the pollen mother cells, the gemini first come to the equatorial plate. Later the univalent chromosomes which are scattered irregularly on the spindle are also arranged in the same plate surrounding the gemini. The partners of the bivalents first pass to the poles. The singles lag a little, divide, and then the halves pass to the poles. The bivalent and univalent chromosomes consequently have different anaphase stages. Not all the halves of the singles may be included in the daughter nuclei. By the second division the descendants of the bivalents are regularly distributed and included, without or with a few of the other chromosomes in the four ordinary microspores. There even arise a great number of small microspores from each mother cell, containing only descendants from the univalent chromosomes. Some of the microspores—probably those containing descendants of the bivalents—develop into pollen grains, are able to germinate, and must be supposed to be capable of fertilization (hybrids between roses in the section *Caninae* are known). In the embryo-sac mother cells we have ordinarily the two equatorial plates—the bivalents next to the chalaza, the singles next to the micropyle. In the anaphase the partners of the gemini are separated; but in about four-fifths of the studied cases, all the singles pass undivided to the micropylar pole. In the second division all the chromosomes are divided. Consequently, the tetrad has two large nuclei and two smaller ones, with only 7 chromosomes. The former

are also included in the greater cells. Eggs which have taken their origin from the larger megaspores are capable of fertilization, as proved by the chromosome sets in hybrids between plants of the section *Caninae* and normally sexual roses. In spite of the sexual potency of the *Caninae* their propagation is almost exclusively apomictical. This fact explains the constancy of the mentioned chromosome sets. Type 10 must be supposed to be originated by fertilization.—“All species and forms investigated, belonging to the section *Caninae*—i.e., the majority of the examined roses, originated in Europe, North Africa and West Asia—are very ancient hybrids representing the F_1 generation, which, ever since its origin thousands of years ago, has been maintained owing to apomictical reproduction.” The anorthoploids represent F_2 or any later generation of crosses. The apomictical reproduction was probably induced by these ancient crosses. To explain all the chromosome sets in the *Caninae*, the existence of octoploid and decaploid sexual forms is assumed. The enormous polymorphy in the *Caninae* is to be ascribed to hybridism. Also vegetative mutations produced in apomictical stocks have no doubt contributed to the polymorphy.—*K. V. Ossian Dahlgren*.

244. THOMSON, GODFREY H. On the degree of perfection of hierarchical order among correlation coefficients. *Biometrika* 12: 355-366. 2 fig. Nov., 1919.—Derivation of Hart-Spearman criterion for degree of hierarchical order (degree in which correlations of any two mental tests with others are in same sequence of magnitude) neglects important term. With correlated dice throws, where true correlations are known *a priori*, criterion exaggerates perfection of hierarchy.—*John Rice Miner*.

245. VANDEL, M. A. Sur la reproduction des Planaires et sur la signification de la fécondation chez ces animaux. [On the reproduction of some Planarians and on the significance of fecundation in these animals.] *Compt. Rend. Acad. Sci.* 171: 125-128. July, 1920.

246. WEATHERWAX, PAUL. A misconception as to the structure of the ear of maize. *Bull. Torrey Bot. Club* 47: 359-362. 6 fig. Aug., 1920.—An attempt to refute the evidence published by COLLINS which indicated that the ear of maize may have developed through the twisting of yoked pairs of spikelets. The author contends from an examination of the cobs of several mature ears that dropping of rows of seeds is due to the discontinuance of a row of paired spikelets and not to the loss of the pedicelled spikelets from yoked pairs, as suggested by COLLINS. In conclusion it is stated that there is no indication that short rows represent long rows partially aborted, but that the abortion of spikelets or of rows in the ear seems to be much more constant as a characteristic of theories than of real ears. Figures four and six apparently have been transposed.—*J. H. Kempton*.

247. W[ESTON, T. A.] [Rev. of: [DIENER, RICHARD]. The law of hybridizing discovered by Richard Diener. 20 x 27 cm., 15 p., 8 fig. Richard Diener: Kentfield, California, [1920.]] *Florists' Exch.* 50: 554. Sept. 11, 1920.—See also *Bot. Absts.* 7, Entries 181, 231, 248.

248. W[ESTON, T. A.] The law of hybridizing. *Florists' Exch.* 50: 981. Nov. 6, 1920.—Reply to WILLIAM H. PHIPPS's criticism of the author's review of [DIENER, R.] The law of hybridizing discovered by Richard Diener. See *Bot. Absts.* 7, Entries 181, 231, 247.—*G. H. Skull*.

249. WOLL, F. W., AND PAUL L. DOUGHERTY. Advanced registry testing of dairy cows. *California Agric. Exp. Sta. Circ.* 218. 15 p. 1920.—Presents arguments for the advanced-registry testing of pure-bred cows, cites records made in California, and gives instructions on how to initiate such a test in California.—*John W. Gowen*.

HORTICULTURE

J. H. GOURLEY, *Editor*

FRUITS AND GENERAL HORTICULTURE

250. ALLEN, W. J., AND W. C. GAY BRERETON. Orchard notes, July. Agric. Gaz. New South Wales 31: 523-525. 1920.—A discussion of pruning of the apple and pear and its relation to the production of fruit buds.—*L. R. Waldron*.

251. ALLEN, W. J., AND W. C. GAY BRERETON. Thompson's Improved and Navalencia oranges. Agric. Gaz. New South Wales 31: 519. 1920.

252. ANONYMOUS. American books on agriculture. [Rev. of: GOULD, H. P. Peach growing. (Rural Science Series.) xxi + 426 p., 32 pl. Macmillan Co.: New York, 1918.] Nature 104: 496-497. 1920.

253. ANONYMOUS. American-grown fruit stocks. Nation. Nurseryman 28⁹: 215. 1 fig. 1920.—A brief history and description of the growing of fruit stocks in America is given. Practically all the apple seedlings in the United States are raised in the Kaw Valley, Kansas. Efforts to grow them on a large scale in other places have not met with marked success.—*J. H. Gourley*.

254. ANONYMOUS. A pear tree trained in an unusual way. Nation. Nurseryman 28⁷: 180. 1 fig. 1920.—A description is given of a pear tree trained in the form of a table. It is growing on the grounds of Bobbink and Atkins Nurseries, Rutherford, New Jersey.—*J. H. Gourley*.

255. ANONYMOUS. La multiplicación de las plantas. [The propagation of plants.] [Rev. of CALVINO, MARIO. Tratado sobre la multiplicación de las plantas. 264 p. 244 photographs. Graphical Arts Press: Habana, 1920.] Rev. Agric. Com. y Trab. [Cuba] 3: 149-151. 1 fig. 1920.—The table of contents of the book is included in the review.—*F. M. Blodgett*.

256. ANONYMOUS. Problems of the fruit grower. [Rev. of: BEDFORD, DUKE OF, AND SPENCER PICKERING. Science and fruit growing: being an account of the results obtained at the Woburn experimental farm since its foundations in 1894. xxii + 351 p. Macmillan and Co.: London, 1919.] Nature 104: 558-559. 1920.

257. ANONYMOUS. Tests with unfruitful plum trees. New Zealand Jour. Agric. 20: 9. 1920.—Pruning, ring-barking, and root-pruning gave no results. Interpollination was effective.—*N. J. Giddings*.

258. ANONYMOUS. The avocado in Trinidad. Agric. News [Barbados] 19: 46. 1920.—A review of a paper on the subject by W. G. FREEMAN in the *Bulletin of the Department of Agriculture*, Trinidad, in which the history, process of selection, etc., are discussed. A paper by R. O. WILLIAMS on budding the avocado is also reviewed.—*J. S. Dash*.

259. BRAINERD, EZRA, AND A. K. PEITERSEN. Blackberries of New England.—Their classification. Vermont Agric. Exp. Sta. Bull. 217. 84 p., 36 pl. 1920.

260. CAMPBELL, J. A. Natural cool-air fruit storage. New Zealand Jour. Agric. 20: 166-167. 1920.—The methods in use in the United States are briefly outlined. It is feared that the same methods could not be used in New Zealand.—*N. J. Giddings*.

261. CAMPBELL, J. A. The fruit industry in North America. New Zealand Jour. Agric. 20: 24-27. 1920.—One of a series of articles. This deals with coöperation and standardization as practiced in the fruit regions of the United States and Canada.—*N. J. Giddings*.

262. CAMPBELL, J. A. **The fruit industry of North America.** New Zealand Jour. Agric. 20: 110-113. 1 fig. 1920.—The eastern and western sections of the United States are compared as to methods of apple culture and orchard practice. The possible relation of seedling stock to tree growth is also discussed.—*N. J. Giddings.*

263. GUNLIFFE, R. S. **The propagation of some tropical fruits.** Agric. News [Barbados] 19: 52-53, 150-151. 1920.—The first part of the article deals principally with the avocado pear. Varieties of this fruit are discussed, and detailed information is given as to methods of budding and grafting, including seed-grafting. In the latter part of the article, the mango is dealt with in the same manner.—*J. S. Dash.*

264. DARROW, WILLIAM H. **Government inspection of fruit shipments.** Rept. Vermont State Hortic. Soc. 17: 21-34. 1919.—This is an account of the work of the Federal Government, through the Bureau of Markets, to assist the fruit growers all over the country in marketing their crops.—*George P. Burns.*

265. DUTTON, W. C. **Dusting and spraying experiments of 1918 and 1919.** Michigan Agric. Exp. Sta. Special Bull. 102. 50 p., 20 fig. 1920.

266. ESAM, G. **Fruit cool storage.** New Zealand Jour. Agric. 20: 10-18. 1920.—Several varieties of apple and of pear were tested to determine best time for picking, best method of picking and handling, effects of delay between picking and storing, and possible advantage of wrapping. Fruits which had reached the stage denoted by a change of ground color kept best in storage. Fruits which were well advanced and showed good color deteriorated too quickly when removed. The importance of care in handling was shown in various tests. Delay in placing the fruit in storage greatly reduced its keeping quality. Wrapping was found to give better fruit, but this is to be tested further.—*N. J. Giddings.*

267. GALLOWAY, BEVERLY T. **Some promising new pear stocks.** Amer. Nurseryman 32²: 34-35. 1920.

268. GASSER, G. W. **Report of the work at Rampart Station.** Rept. Agric. Exp. Sta. 1917: 34-57. Pl. 3, 4. 1919.—See Bot. Absts. 7, Entry 26.

269. GEORGESON, C. C. **Reports from seed and plant distribution.** Rept. Alaska Agric. Exp. Sta. Rept. 1917: 86-90. 1919.—Gives extracts from letters received from residents of Alaska giving their experience with the seeds and plants distributed by the Alaska stations.—*J. P. Anderson.*

270. GEORGESON, C. C. **Summary of the work at the several stations.** Rept. Alaska Agric. Exp. Sta. 1917: 5-33. 2 pl. 1919.—After a review of weather conditions the author summarizes the work carried on at the Sitka, Rampart, Fairbanks, Kodiak, and Matamuskas stations, and gives notes on coöperative work. The Sitka station is devoted to horticulture. Notes are given on potatoes, including the growing of plants from seed balls. Notes are also given on other vegetables, such as cabbage, cauliflower, broccoli, Brussels sprouts, kale, kohlrabi, turnips, radishes, beets, carrots, onions, peas, broad beans, snap beans, asparagus, rhubarb, lettuce, celery, garden cress, parsley, and herbs. Beets, onions, snap beans, asparagus, and most herbs are not adapted to the climate, but the others mentioned above do well. In the orchard some apples blossomed, but owing to an unfavorable season no fruit matured. Gooseberries and currants did not fruit as well as usual. Raspberries (*Rubus strigosus*) produced fruit despite an unfavorable season. Strawberry-breeding work was carried on, and 1333 seedlings set out the previous season received numbers. A large amount of nursery stock was distributed to settlers. Reports are made on the behavior of 30 species of shrubs and of several shade trees. Thirty-five species of hardy perennial plants are reported favorably and 27 unfavorably. Of annual flowering plants 24 species are reported favorably and 13 unfavorably. All annual and perennials listed are well-known sorts. Roses are also being tested in the trial grounds. Work at the other stations is given in more detail by the assistants in charge of each.—*J. P. Anderson.*

271. GOODWIN, W. T., AND W. C. HYDE. **Coöperative fruit variety testing.** New Zealand Jour. Agric. 20: 178-180. 1920.—The variety orchards are 7 years old and include about 75 varieties of apple, 24 varieties of pear, and several varieties of apricot, plum, and cherry. Tree growth and fruitfulness are the chief factors considered.—*N. J. Giddings.*

272. GOULD, H. P. **Fruit trees stocks used in propagation.** Amer. Nurseryman 32²: 42-44. 1920.

273. GOULD, W. M. **Production of nursery stock.** Rept. Vermont State Hortic. Soc. 17: 12-20. 1919.—The problems confronting the grower of nursery stock, including both fruit-producing trees and plants for ornamental use, are discussed, chiefly from the standpoint of production.—*George P. Burns.*

274. HALLIGAN, C. P. **Increasing the production of the bearing apple orchard.** Michigan Agric. Exp. Sta. Circ. 43. 18 p., 6 fig. 1920.

275. HOLDEN, BERTHA A. **Ways of using surplus fruits.** Rept. Vermont State Hortic. Soc. 17: 43-46. 1919.

276. HOWARD, W. L. **Brown rot of apricots and its prevention.** Better Fruit 15¹: 7. 1920.

277. LEWIS, C. I., F. R. BROWN, AND A. F. BARSS. **Observations on the evaporation of prunes.** Better Fruit 15³: 5, 29-31. 1920.—A reprint from Oregon Agric. Exp. Sta. Bull. 145 (1917).

278. MAGNESS, J. R. **Investigations in the ripening and storage of Bartlett pears.** Jour. Agric. Res. 19: 473-500. 8 fig. 1920.—Fruits grown in Pacific-coast regions and picked at intervals from early summer until after the commercial picking season, were analyzed within a few days after picking and after being in storage 1½ to 3½ months at temperatures of 70°, 40°, and 30° F. The total sugar in freshly picked fruit showed a uniform increase as the season advanced, the less rapid increase in reducing sugars during the latter part being counterbalanced by a greater accumulation of sucrose. Pears ripening at 70° contained the highest percentage of sugar, those ripening at 40° the lowest, and those held at 30° for 6 to 14 weeks an intermediate amount. The acid content decreased with an advance of the season in pears from California, but increased in fruit from Oregon and Washington. Little change in acidity was found during storage of fruit that had been well matured at picking time; but an increase in acidity generally occurred during storage at 70° of fruit picked before maturity, while a decrease was often found after ripening at 40° and especially after being held at 30° F. There was a progressive reduction in the alcohol-insoluble, acid-hydrolyzable reducing materials as the season advanced, not only in the fruit as picked, but also in the same fruit after ripening in storage. The percentage of solids, lowest at about the opening of the season, tends to increase with the accumulation of sugar in late-picked lots. Although late-picked fruit tends to become yellow more quickly than early-picked lots, it remains free from scald and in firm, prime eating condition for a much longer period after becoming ripe.—The application of the results as applied to commercial handling are briefly discussed.—*A. J. Heinicke.*

279. MORRIS, R. T. **Grafting with the aid of paraffin.** Jour. New York Bot. Gard. 21: 157-159. pl. 250. 1920.—A brief outline is presented, and the claim is made that the grafting season can be extended over a period of 5 months.—*H. A. Gleason.*

280. MURRILL, W. A. **Trees girdled by meadow mice.** Jour. New York Bot. Gard. 21: 94-97. 1920.—The habits of meadow mice and the destruction to plants caused by them are discussed.—*H. A. Gleason.*

281. RAMSEY, H. J., AND S. J. DENNIS. Operating air-cooled apple storage houses. Better Fruit 15³: 10, 32-34. 1920.—A verbatim excerpt from U. S. Dept. Agr. Farmers' Bull. 852 (1917).

282. RICALTON, JAS. The cocoa-nut palm. Amer. Forest. 26: 529-531. 3 fig. 1920.—A popular description of *Cocos nucifera* and its products.—Chas. H. Otis.

283. ROBERTS, GEORGE, AND A. E. EWAN. I. Report on soil experiment fields. II. Maintenance of fertility. Kentucky Agric. Exp. Sta. Bull. 228: 89-131. 1920.—See Bot. Absts. 7, Entry 463.

284. RUSSELL, E. J. Farming in the New Era. [Rev. of (1) HARRIS, T. S. The sugar beet in America. xviii + 342 p., 32 pl. 1919. (2) FLETCHER, S. W. Strawberry growing. xii + 325 p., 24 pl. Macmillan and Co.: London, 1917.] Nature 104: 593-594. 1920.

285. SEARS, F. C. Personal experiences in fruit growing. Rept. Vermont State Hort. Soc. 17: 8-12. 1919.—The author discusses nine important factors in the producing, grading, and marketing of apples.—George P. Burns.

286. STARK, LLOYD C. French fruit stocks. Nation. Nurseryman 28³: 193. 1920.—A French syndicate has been organized which apparently controls a large part of the nursery stock grown in France. As a result the prices have increased to a prohibitive figure, despite the fact that there is a big crop this year of everything except plum, and this is more plentiful than last year. The respective prices per thousand for last year and this year are quoted for plums as \$39 and \$250, while this same stock formerly sold for \$7. In France pear stock can be purchased for \$19 per thousand, whereas the price quoted for export is \$70; in France quince stock, \$17, for export \$50. This situation is condemned, and it is stated that no stock will be purchased at these prices.—J. H. Gourley.

287. SUEMATSU, NAOJI, AND KIKUJI KUWATSUKA. Studies on the varietal resistance of the peach to artificial inoculations with *Gloeosporium laeticolor* Berk. Ann. Phytopath. Soc. Japan 1³: 1-12. 1920.

288. TAYLOR, C. R. The auction method of distributing perishable food products. Rept. Vermont State Hort. Soc. 17: 35-43. 1919.—The author describes the auction system, and shows that in cases of large production with a standardized commodity concentrated at one place it is the most efficient method of disposing of the product.—George P. Burns.

289. THORNER, H. Cover crops, tillage, and commercial fertilizers. Better Fruit 15²: 5, 20-22. Aug., 1920.—Experiments conducted for eight years in the Bitter Root Valley, Montana, with clover and peas as cover crops resulted in a substantial increase of the nitrogen content of the soil. Clover was sown in May and plowed under in the fall of the following year. Peas were also sown in May, but were plowed in the same fall. The first soil analysis was made after the experiment had been in progress for eight years. The nitrogen content of the first two feet of soil of clean cultivated plots was 1514 pounds per acre, while the plot sown to a cover crop of clover contained 3019 pounds per acre. Another plot sown to clover but cut each year, the hay being removed, showed a total nitrogen content of 2167 pounds. The plot on which peas were used as a cover crop had 2375 pounds of nitrogen per acre. The yield of fruit (apples) was highest on the clover plot on which the clover had been plowed under, and lowest on the clean cultivated plot. The writer believes that growing a leguminous cover crop is by far the best and most reasonable way of supplying the soil with humus and nitrogen.—A. E. Murneek.

290. WATSON, JOHN. Aphis-resistant apple stocks. Nation. Nurseryman 28³: 213-214. 1920.—The nurserymen of America must come to appreciate to a greater extent the importance of securing nursery stock which will be resistant to aphis injury. The influence of the stock upon the scion as well as the influence of the scion on the stock is recognized. For

instance, apple grafts of Bechtel's Crab and of Transcendant will compel a far better root system in two years than scions of Baldwin or Yellow Transparent on seedlings of exactly the same grade.—Of all aphid-resistant stocks the Northern Spy is the best. It is largely used in England, South Africa, Australia, and New Zealand. The suggestion is made that the time will probably come when California will use nothing else. In Australia, where woolly aphid is a prolific pest, the nurserymen have developed more than 25 varieties of resistant stocks, but Northern Spy furnishes fully 95 per cent of the apple stock used.—Methods for propagation of the stock are given, which are much like those used for Paradise and Doucin stocks.—*J. H. Gourley.*

291. WHITTEN, J. C. Transplanting deciduous fruit trees. Better Fruit 15³: 19-20. Sept., 1920.—Reprinted from Monthly Bulletin of the Dept. of Agr., State of California, vol. 9, No. 3, March, 1920.

FLORICULTURE AND ORNAMENTAL HORTICULTURE

292. ANONYMOUS. Awbury Arboretum. Brooklyn Bot. Gard. Rec. 9: 23-24. Jan., 1920.—See Bot. Abstracts 7, Entry 77.

293. ANONYMOUS. *Koeleruteria paniculata*. Nation. Nurseryman 28⁸: 198. 1920.—A description of the tree is given, with conditions for growth, and a recommendation is made to extend its planting for lawns.—*J. H. Gourley.*

294. ANONYMOUS. *Oxydendrum arboreum*. Nation. Nurseryman 28⁸: 196. 1920.—A description of the sour-wood tree.—*J. H. Gourley.*

295. ANONYMOUS. Prospectus of courses offered by the Brooklyn Botanic Garden, 1920. Brooklyn Bot. Gard. Record 9: 1-18. Jan., 1920.

296. ANONYMOUS. Sweet pea flowering in the West Indies. Agric. News [Barbados] 19: 105. 1920.—All efforts of horticulturists in the West Indies to cultivate the American and European sweet peas (*Lathyrus odoratus*) have resulted in failure to produce flowers in spite of the vigorous vegetative growth made by the plant. Dr. S. C. HARLAND at last succeeded in obtaining a single flowering spike after 3 months' growth, from a pink variety of the Spencer type procured from the United States Department of Agriculture. The flowers were very small and without scent.—*J. S. Dash.*

297. ANONYMOUS. The climbing Polygonum. Nation. Nurseryman 28⁸: 200. 1920.—Notes are given regarding *P. Baldschuanicum* and *P. Auberti*.—*J. H. Gourley.*

298. BREWSTER, A. A. Flowers of *Haemodorum*, blood root. Australian Nat. 4: 152. 1920.

299. BRITTON, N. L. About Paulownia trees. Jour. New York Bot. Gard. 21: 72-73. 1920.—Young *Paulownia* trees commonly grow 8-12 feet in a season and produce leaves as much as 30 inches in diameter. After 3 years they grow more slowly and become eventually 60 feet high or more.—*H. A. Gleason.*

300. CLARKSON, EDWARD HALE. The story of a fern garden. II. Amer. Fern. Jour. 10: 82-87. 1920.

301. COWELL, ARTHUR WESTCOTT. Awbury Arboretum Address. Bull. Geog. Soc. Philadelphia 17: 98-102. July 1919.—See Bot. Abstracts 7, Entr.

302. GLEASON, H. A. Organization of The American Iris Society. Jour. New York Bot. Gard. 21: 39-40. 1920.—The society was organized on Jan. 29, 1920, to promote the cultivation and further development of *Iris* in America.—*H. A. Gleason.*

303. HOWE, M. A. The 1920 dahlia border. Jour. New York Bot. Gard. 21: 138. 1920.

304. MEMMLER, HANS. Paphiopedilum Rothschildianum und die Kultur der übrigen mehrblütigen Frauenschuharten. [Paphiopedilum Rothschildianum and the culture of the other several-flowered ladyslippers.] Orchis 14: 17-21. 1920.—Short descriptions are given of *P. Rothschildianum*, its numerous hybrids, and closely related species. Cultural directions are included.—E. B. Payson.

305. MIETHE, E. Cypripedium insigne Wall. und einige seiner Varietäten. [Cypripedium insigne Wall. and some of its varieties.] Orchis 14: 4-7. 1920.

306. NASH, G. V. Hardy woody plants in The New York Botanical Garden. Jour. New York Bot. Gard. 18: 65-68, 86-90, 111-115, 137-140, 167-170, 189-192, 203-207, 217-224, 246-250, 259-263. IDEM. 19: 11-15, 58-62, 86-91, 108-111, 139-142, 167-171, 192-196, 222-225, 293-296, 315-318. 1918; 20: 11-14, 41-45, 67-70, 87-90, 107-111, 128-132, 144-148, 164-167, 221-225, 232-235. 1919; 21: 56-60, 74-77, 119-124. 1920.—A complete enumeration of the hardy woody plants cultivated in the botanical garden, with their location on the grounds and their natural distribution.—H. A. Gleason.

307. SANDS, W. N. Some tropical variegated-leaved plants. Agric. News [Barbados] 19: 154-155, 171. 1920.—The following are mentioned as the plants chiefly grown for the color effects of their foliage: varieties of *Dracaena*, *Acalypha*, *Codiaeum* (*Croton*), *Caladium*, *Graptophyllum*, *Coleus*, *Dieffenbachia*, *Agave*, *Aloe*, *Begonia*, *Maranta*, and *Tradescantia*, together with *Pandanus Veitchii*, *Panax Victoriae*, *Ficus elastica* var., *Furcrocra cubensis*, *Aralia Guilfoylei*, *Sanchezia nobilis*, *Cissus discolor*, *Hibiscus rosa-sinensis*, var. *Cooperi*, *Phyllanthus nivosus*. Several of these are discussed in detail, information being given as to the appearance of the leaves, the causes of variations, and the inheritance of the phenomena. Several plants which are not well known in the West Indies but which are under cultivation at the John Innes Horticultural Institution, Surrey, England, are also dealt with.—J. S. Dash.

308. SCHLECHTER, R. Die Verbreitung und das Auftreten der Orchideen in Europa nebst Winken über ihre Kulture. [The distribution and occurrence of orchids in Europe together with hints as to their culture.] Orchis 13: 19-25, 35-40. 1919.—See Bot. Absts. 7, Entry 541.

309. SNODGRASS, M. D. Report of the work at Fairbanks Station. Rep. Alaska Agric. Exp. Sta. 1917: 57-72. Pl. 5-7. 1919.

310. WAUGH, F. A. How to improve home grounds. Rept. Vermont State Hortic. Soc. 17: 62. 1919.

311. WOLTER, P. Die Anzucht der Odontoglossum aus Samen. [The raising of *Odontoglossum* from seed.] Orchis. 13: 12-13. 1919.—*Odontoglossum* seeds were sown in glasses on sterilized *Sphagnum* and *Polypodium* to which a mixed culture of root fungi had been added. More than a thousand seedlings were obtained which in the third year are beginning to bloom.—E. B. Payson.

VEGETABLE CULTURE

312. ANONYMOUS. Onion growing in Grenada. Agric. News [Barbados] 18: 374-375. 1919.—Experiments show that onions can be profitably grown. Two crops per annum may be obtained. The yield per acre, as calculated from the experiments, was 3.38 tons of marketable onions.—J. S. Dash.

313. ANONYMOUS. The storage of onion seed in the Tropics. Agric. News [Barbados] 18: 375. 1919.—Experiments carried out in Grenada have shown that onion seed can be successfully kept for at least nine months when placed in air-tight containers in the presence of calcium chloride.—J. S. Dash.

HORTICULTURE-PRODUCTS

314. FABRE, J. -HENRI. *Procédés modernes de vinification en Algérie et dans les pays chauds.* [Modern methods of wine making for Algeria and the warm regions.] 2 ed. 184 p. J. -Henri Fabre: Maison-Carré, 1920.

315. JONES, J. *Cacao production in Dominica.* Agric. News [Barbados] 19: 91. 1920.—Attention is drawn to the fact that owing to the losses of trees during the hurricanes of 1915 and 1916 (in the latter over 10,000 trees were lost on the estates and even more from the peasants plots) and to the large amount of cacao smuggled to the neighboring foreign islands where the product was in great demand, the figures of export given by the Customs Department are hardly an index of the production. These figures are: 1917, 3169 cwt.; 1918, 4239 cwt.; and 1919, 3214 cwt. for the months of January to November. The writer remarks that while the trees which survived the hurricane have returned to pre-hurricane production, little or no effort has been made to replace the trees destroyed.—J. S. Dash.

MORPHOLOGY, ANATOMY AND HISTOLOGY OF VASCULAR PLANTS

E. W. SINNOTT, *Editor*

316. ANDREWS, E. F. *Habits and habitats of the North American Resurrection Fern.* *Torreya* 20: 91-96. 1920.

317. ANONYMOUS. *Applied plant morphology.* [Rev. of: BARBER, C. A. *Studies in Indian sugar canes.* Mem. Dept. Agric. India Bot. Ser. 10: 39-153. June, 1919]. *Nature* 104: 578. 1920.—See Bot. Absts. 7, Entry 7.

318. BURNS, GEORGE P. *Eccentric growth and the formation of redwood in the main stem of conifers.* *Vermont Agric. Exp. Sta. Bull.* 219: 1-10. *Pl.* 4, 10 fig. 1920.—This bulletin is a discussion of the relative importance of compression and gravity as factors in the production of redwood in conifers, based on experimental work in the greenhouse and in the open on spruce and white pine. The author concludes that compression does not stimulate the cambium to rapid division to produce redwood. The pressure of mechanical forces did cause, in the white pine, a differentiation into summer wood and spring wood, but no redwood formation. The conclusion is, therefore, that the production of redwood is a morphogenic response of the tree to the stimulus of gravity.—B. F. Lutman.

319. CHEMIN, E. *Observations anatomiques et biologiques sur le genre "Lathraea."* [Anatomical and biological observations on the genus "Lathraea."] *Ann. Sci. Nat. Bot.* X, 2: 125-272. 1 pl., 88 fig. 1920.—A contribution to knowledge of parasitic plants. After reciting the generic and specific characters in *Lathraea*, recognizing the five species listed in *Index Kewensis*, the author presents observations on the two French species *L. clandestina* and *L. squamaria*, dealing with root, with development, penetration and feeding of haustorium, with leaves present as scales bearing glands (which, according to the author's hypothesis, function as excretory organs), and with germination. The author supposes that originally an accidental and partial parasitism caused adaptation to dark places, and that this led to complete disappearance of chlorophyll and to obligate parasitism.—J. P. Kelly.

320. CHURCH, MARGARET B. *Root contraction.* *Plant World* 22: 337-340. 1 fig. 1919.

321. GLÜCK, H. *Blatt-und blutenmorphologische Studien.* [Studies in the morphology of leaf and flower.] 284 p., 7 pl., 284 fig. Gustav Fischer: Jena, 1919.—A broad morphological survey of stipular structures in general, of intervaginal papillae and of the leaf sheath, with a resulting interpretation of the morphological nature of bracts and floral envelopes. The venation of these latter organs plays an important part in any study of their nature, and considerable emphasis is therefore placed upon it and upon the ontogenetic development of the structures investigated.—E. W. Sinnott.

322. GOEBEL, K. Die entfaltungsbewegungen der Pflanzen und deren teleologische Deutung. [The growth movements of plants and their teleological meaning.] 17 × 26 cm., vii + 483 p., 239 fig. Gustav Fischer: Jena, 1920.—This volume is in the nature of a supplement to the author's "Organographie" and is concerned with plant movements in general, both those which are strictly movements of growth and development and those which are part of the functional activity of organs. Among the subjects discussed are: the movements of jointed organs; the nutation of shoots; the unfolding of leaves and their orientation; developmental torsions and asymmetry; resupination in flowers; successional development; irritability in floral organs; the behaviour of sensitive plants and the "sleep" movements of plants. The author seeks an interpretation of all these movements from the point of view of their usefulness to the plant, and concludes that the common conception of these phenomena as adaptations is erroneous. He denies that teleology in any sense, either that of purposeful acquirement or that of Darwinian adaptation through natural selection, has been concerned with their origin, but believes that they have arisen fortuitously and when useful have been seized and preserved by the organisms.—E. W. Sinnott.

323. HAMILTON, A. A. Abnormal branching in a palm. Australian Nat. 4: 156-157. 1920.

324. HOLDEN, H. S. Observations on the anatomy of teratological seedlings. III. On the anatomy of some atypical seedlings of *Impatiens Roylei*, Walp. Ann. Botany 34: 321-344. 106 fig. 1920.—The anatomy of the normal seedlings of *Impatiens Roylei* and the modifications which it has undergone in a number of abnormal seedlings are fully described. The atypical seedlings are of two main kinds, the first being undoubtedly syncytious, and the second showing no macroscopic evidence of syncotyly. The members of the first group can be arranged in a graded series in which the syncotyly becomes more and more intimate. Its effects are (1) the suppression of the two lateral bundles of the normal cotyledon and of the root pole on the symphysis side, (2) the reduction and ultimate disappearance of the first epicotyledonary leaf, and (3) in extreme cases the modification of the leaves at the third node. The seedlings of the second group which show no macroscopic evidence of syncotyly may be either truly syncytious or heterocotylous, and the evidence in favor of both interpretations is mentioned.—W. P. Thompson.

325. JACCARD, P. Inversion de l'excentricité des branches produite expérimentalement. [The experimental inversion of the eccentricity of branches.] Rev. Gén. Bot. 32: 273-281. 2 pl., 1 fig. 1920.—See Bot. Absts. 7, Entry 431.

326. LECOMTE, HENRI. Sur les principaux caractères de structure des Bois. [The principal characters in wood structure.] Bull. Mus. Hist. Nat. Paris 26: 166-171. 1920.—A study of the dicotyledonous woods of Indo-China has been made in order to assist in the identification of specimens from that region. The structures of secretory tissues, vessels, woody parenchyma and medullary rays are reviewed, and their peculiarities in various genera indicated.—E. B. Payson.

327. LENOIR, M. Évolution du tissu vasculaire chez quelques plantules de dicotylédones. [Development of vascular tissue in certain dicotyledonous seedlings.] Ann. Sci. Nat. Bot. X. 2: 1-123. 91 fig. 1920.—Author deals with very young fibro-vascular bundles at their passage from root, where arrangement of xylem and phloem is alternate, to stem and cotyledon, where collateral disposition is found. He presents and criticises two theories on subject: (1) that which claims the splitting radially into two of the primary xylem masses of root ("redoublement"), and the turning through 180° ("torsion") of each half in passing up to become inner part of collateral bundle of stem or cotyledon; and (2) the theory of successive stages, which states that conducting apparatus of plant shows an ontogenetic series of stages—centric, excentric, alternate, intermediate, and collateral—and that there is not a real identity of root bundle and cotyledonary bundle. Author sets forth observations on species of *Veronica*, *Lamium*, and other genera, and concludes that no true radial

splitting occurs; that in all there is more or less of an inversion of the fibro-vascular bundle upon itself; that no absolute identity of cotyledonary and radicular bundles exists, but that always there are additions of recent tissues in higher parts. Passage from alternate to collateral arrangement follows two methods. A gradual differentiation of vessels occurs along certain lines, curved in cross-section, connecting the xylem and phloem poles. Considered longitudinally a progressive displacement of vessels combined with appearance of new elements in appropriate directions takes place.—*J. P. Kelly.*

328. MILBRAED, J. *Paraphyadanthé* Mildbr. nov. gen. Flacourt. Ein interessanter Fall von "Rhizanthie" aus Kamerun. [*Paraphyadanthé* Mildbr., a new genus of Flacourtiaceae. An interesting case of "rhizanthy" from Kamerun.] Notizbl. Bot. Gart. Berlin 7: 399-405. Fig. A-O. 1920.

329. NICOLAS, G. Biologie florale de quelques ombellifères Nord-Africaines. [Floral biology of some North African umbellifers.] Rev. Gén. Bot. 32: 230-234. 1920.—Andromonoecism, or the presence of staminate and hermaphrodite flowers on the same plant, is very rare in the plant kingdom as a whole, but is comparatively common in the Umbelliferae. LOEW found this condition in more than forty out of sixty-six European species. Some species are staminate, hermaphrodite, and andromonoecious in different geographic regions. To the list of sixteen species stated by LOEW to be exclusively hermaphroditic in Europe, four North African species are added: *Ptychotis ammoides* Koch., *Daucus aureus* Desf., *Torilis neglecta* Roemer & Schultes, and *T. nodosa* Gaertn. The andromonoecious condition holds in *Scandix Pecten-Veneris* L., *Hippomarathrum pterochaenum* Bossier, *Ferula communis* L., *F. sulcata* Desf., and *Daucus setifolius* Desf. In these forms the hermaphroditic flowers always occupy the summits of the primary and secondary axes, while the more numerous staminate flowers are either mixed with them or are grouped alone on the secondary and tertiary axes.—*L. W. Sharp.*

330. PRANKERD, T. L. On some new types of statocyte occurring in vascular plants. [Abstract.] Rept. British Assoc. Adv. Sci. 1919: 335. 1920.

331. RYDBERG, P. A. [Rev. of: HENRY, AUGUSTINE, AND MARGARET G. FLOOD. The Douglas Fir, Proc. Roy. Irish Acad. Sec. B. 35: 67-92. Pl. 12-14. 1920.] Torrey 20: 102-104. 1920.

332. SALISBURY, E. J. Monocotyledonous features of the Ranunculaceae with special reference to the floral structure. [Abstract.] Rept. British Assoc. Adv. Sci. 1919: 336. 1920.

333. SMALL, JAMES. The origin and development of the Compositae. xii + 334 p. William Wesley and Son: London, 1919.—A reprint of the author's series of papers under the same title which have appeared during the last two years in the New Phytologist. (See Bot. Absts. 2: 72, 73, 74, 75; 3: 1142; 5: 720, 721.)

334. SOUÈGES, RENÉ. Embryogénie des Oenothéracées. Développement de l'embryon chez l'Oenothera biennis L. [The embryogeny of the Oenotheraceae. The development of the embryo of Oenothera biennis.] Compt. Rend. Acad. Sci. Paris 170: 946-949. 11 fig. 1920.—The 4-celled stage resembles that of most angiosperms. The upper 2 cells give rise to the cotyledons and the hypocotyl. The middle cell develops very early into the hypophysis, and the lower to the few-celled suspensor.—*C. H. Farr.*

335. THOMPSON, JOHN McLEAN. The morphology of the stele of *Platyzoma microphyllum*. [Abstract.] Rept. British Assoc. Adv. Sci. 1919: 332-333. 1920.

336. VUILLEMIN, P. L'amphigonelle et la phylogénie des amentales. [The "amphigonelle" and the phylogeny of the Amentales.] Ann. Sci. Nat. Bot. X, 1: 139-200. 1919.—Author is adverse to use of word *flower* for precise scientific writing; *amphigonelle* is his term for type of

reproductive apparatus widespread in lower groups of Dicotyledons, especially in Amentales. He distinguishes three stages of evolution of reproductive apparatus or "gonelle:" (1) *Amphigonelle*, which represents lowest degree of differentiation among Dicotyledons, and is characterized by diffuseness, for axis is polycentric—i.e., with many centers of growth; (2) *Acrogonelle* with a concentration of parts making a monocentric axis; and (3) *Anthogonelle*, which is set off from preceding by development of corolla. The last corresponds best with popular conception of *flower*. Bound up with above ideas is author's theory of stem evolution—that there are two principal stages, the stage of the *stipe* with its *frondomes* and stage of the *caulome* with its *phyllomes*. The *amphigonelle* is considered stipular in character, as shown in polycentric axis; its receptacle is broken up into *gonoclines*, each of which builds a part of the *gonelle* called *gonelette*. The *amphigonelle* is one of the characteristics of Amentales; and the catkin, capitulum, or glomerulus are *amphigonelles* rather than flowers or inflorescences. Amentales afford opportunity to study modifications of *amphigonelle* and its transition to *acrogonelle*. Author devotes most of work to morphological analysis of class Amentales, applying above and other details of his conceptions.—In a second (smaller) portion he presents his ideas of the phylogeny of class, in which he includes the following orders: Juglandales, Salicales, Casuarinales, Cupuliferae, Myricales, Piperales, and Chloranthales.—James P. Kelly.

337. WINKLER, HANS. *Verbreitung und Ursache der Parthenogenesis im Pflanzen- und Tierreiche*. [The occurrence and causes of parthenogenesis throughout the animal and plant kingdoms.] vi + 231 p. Gustav Fischer: Jena, 1920.

MORPHOLOGY AND TAXONOMY OF BRYOPHYTES

ALEXANDER W. EVANS, *Editor*

338. ANONYMOUS. *Sphagna*. Moss Exchange Club Ann. Rept. [York] 23: 205-210. 1918.—The species of *Sphagnum* listed number 33 and represent the specimens offered for exchange by the Club during 1917. Several of the species include named varieties and forms. Critical notes by J. A. W[HELDON] are interspersed throughout.—A. W. Evans.

339. ANONYMOUS. *True mosses*. Moss Exchange Club Ann. Rept. [York] 23: 210-214. 1918.—Under the "true mosses" only the *Acrocarpi* are included. The species listed number 65, and critical notes are furnished by R. N. M[ELDRUM], W. E. N[ICHOLSON], AND J. A. W[HELDON].—A. W. Evans.

340. ANONYMOUS. *Pleurocarpi*. Moss Exchange Club Ann. Rept. [York] 23: 214-217. 1918.—The *pleurocarpous* mosses listed number 33, and the critical notes included are by H. N. D[IXON], W. I[NGHAM], AND J. A. W[HELDON].—A. W. Evans.

341. ANONYMOUS. *Hepatics*. Moss Exchange Club Ann. Rept. [York] 23: 217-219. 1918.—The species listed include 5 *Ricciae*, 33 *Jungermanniales*, and 1 *Anthoceros*. *Lepidozia intermedia* Schiffn. is recognized as a valid species, although SCHIFFNER had proposed it provisionally. The critical notes are by H. H. K[NIGHT] AND S. M. M[ACVICAR].—A. W. Evans.

342. ANONYMOUS. *Synopsis of the European Sphagna* [Corrections and additions]. Moss Exchange Club Ann. Rept. [York] 23: 219-221. 1918.—The data here given are supplementary to J. A. W[HELDON]'S work, published under the above title. The "additions" relate to varieties and forms of 19 species of *Sphagnum*, all supposedly new to the British Isles. Two of these are varieties of *S. franconiae* Warnst., a species not included in earlier lists of British *Sphagna*.—A. W. Evans.

343. ANONYMOUS. *Sphagna*. Moss Exchange Club Ann. Rept. [York] 24: 229-234. 1919.—The species of *Sphagnum* listed number 26 and include numerous varieties and forms. As in the previous Annual Report many of the specimens cited are accompanied by critical remarks, signed "J. A. W[HELDON]."—A. W. Evans.

344. ANONYMOUS. **True mosses.** Moss Exchange Club Ann. Rept. [York] 24: 234-241. 1919.—The acrocarpous mosses listed number 96 and include 6 species from continental Europe and 1 each from New Zealand and Canada, the remaining species being all represented by British specimens. Critical notes by H. N. D[IXON], H. H. K[NIGHT], W. E. N[ICHOLSON], P. G. M. R[HODES], AND W. I[NGHAM] accompany the citations, one of the most important of these notes relating to *Dicranum Bonjeani* var. *alatum* Barnes.—A. W. Evans.

345. ANONYMOUS. **Pleurocarpi.** Moss Exchange Club Ann. Rept. [York] 24: 241-243. 1919.—Except for 1 species from Switzerland the 35 pleurocarpous mosses listed are all from the British Isles. *Hypnum fluitans* var. *atlanticum* Ren. and *H. uncinatum* var. *plumulosum* Schp. are discussed at some length by J. A. W[HELDON], and shorter notes by the same writer and by W. I[NGHAM] are included.—A. W. Evans.

346. ANONYMOUS. **Hepatics.** Moss Exchange Club Ann. Rept. [York] 24: 244-247. 1919.—The 66 species listed include 5 from Tasmania, 3 from continental Europe and 1 from Africa, the remainder being represented by British specimens. Notes by P. G. M. R[HODES], H. H. K[NIGHT], AND S. M. M[ACVICAR] accompany the citations, the note by the last having reference to the recently described *Herberta Hutchinsiae* (Gottsche) Evans.—A. W. Evans.

347. ANONYMOUS. **Sphagna.** Moss Exchange Club Ann. Rept. [York] 25: 257-259. 1920.—The *Sphagna* distributed during 1919 numbered 25 species, several of which were represented by numerous varieties and forms. One specimen came from Canada, the others from the British Isles. A few short critical notes by J. A. W[HELDON] are included in the report.—A. W. Evans.

348. ANONYMOUS. **True mosses.** Moss Exchange Club Ann. Rept. [York] 25: 259-264. 1920.—Both the Acrocarpi and the Pleurocarpi are here included under the "true mosses," 97 species in all being listed. Of the specimens cited 14 came from Scandinavia, 7 from other parts of continental Europe, 4 from Canada and the remainder from the British Isles. The notes accompanying the citations of specimens are by H. N. D[IXON], D. A. J[ONES], H. H. K[NIGHT], W. E. N[ICHOLSON], W. I[NGHAM], AND J. A. W[HELDON].—A. W. Evans.

349. ANONYMOUS. **Hepatics.** Moss Exchange Club Ann. Rept. [York] 25: 264-266. 1920.—Of the 46 species listed 10 came from continental Europe, the others from Great Britain. All except 3 are Jungermanniales. H. H. K[NIGHT] and D. A. J[ONES] have contributed a few critical remarks.—A. W. Evans.

350. BROTHERUS, V. F. **Contributions à la flore bryologique de l'Ecuador.** [Contributions to the moss flora of Ecuador.] Rev. Bryologique 47: 1-16. 1920.—The present report is based on a collection of mosses made in 1909 and 1910 by the late ABBÉ ALLIONI in the provinces of Oriente and Azuay, Ecuador. The majority of the specimens came from Oriente, a region heretofore unknown bryologically. In the first part of the report (which is to be continued) 95 species belonging to 19 families are listed with definite data regarding stations. The families most largely represented are the Neckeraceae with 25 species, the Dicranaceae and the Pottiaceae with 12 each. The following species, 20 in all, are described as new: *Barbula ecuadoriensis*, *B. hyalinobasis*, *B. linguacupes*, *Breutelia Allionii*, *B. brachyphylla*, *B. reclinata*, *Bryum Allionii*, *Campylopus tener*, *Fissidens Allionii*, *F. altolimbatus*, *Grimmia Allionii*, *Hyophila grossidens*, *Molendoa subobtusifolia*, *Pilopogon macrocarpus*, *Pilotrichella Allionii*, *Pleurochaete ecuadoriensis*, *Porothamnium gracile*, *Syrhophodon macrophyllus*, *S. subrigidus*, and *S. subscaber*. The following represent new combinations: *Campylopus liliputanus* (C. Müll.) Broth. (*Pilopogon liliputanus* C. Müll.) and *Porotrichodendron superbum* (Tayl.) Broth. (*Leskea superba* Tayl.).—A. W. Evans.

351. LUISIER, A. **Les mousses de Madère.** [Mosses of Madeira.] Broteria, Ser. Bot. 18: 79-97. 1920.—This is the eighth article of a series previously noticed, which discusses completely the mosses of Madeira. The present installment covers the two families Sema-

tophyllaceae and Brachytheciaceae. Besides the usual data upon collections and local distribution, the author gives detailed notes upon the species or varieties listed below, all of which are of restricted occurrence or little known. These species are: *Homalothecium sericeum* (L.) B. & S. var. *Mandoni* (Mitt.) R. & C., *Brachythecium Cardoti* Wint., *Oxyrrhynchium orotavense* R. & C., *Rhynchostegiella Bourgeana* (Mitt.) Broth., *Rh. surrecta* (Mitt.) Broth., and *Rhynchostegium Winteri* Card. [See Bot. Absts. 6, Entry 156].—*E. B. Chamberlain.*

352. PEARSON, WM. HY. *Apolozia Pendletonii* Pearson, n. sp. *Bryologist* 23: 50-52. Pl. 2. 1920.—This new hepatic is related to *Jungermannia cordifolia* Hook. It was collected at Sisson, California.—*E. B. Chamberlain.*

353. WHELDON, J. A. Recent new *Sphagnum* records. Moss Exchange Club Ann. Rept. [York] 24: 247-252. 1919.—The specimens cited represent new county records for Great Britain. Thirty-four species of *Sphagnum* are listed, including numerous varieties and forms, some of which are here reported for the first time from the British Isles.—*A. W. Evans.*

354. WILLIAMS, R. S. *Grimmia* (*Guembelia*) *brevirostris*, sp. nov. *Bryologist* 23: 52-53. Pl. 3. 1920.—A detailed description of a new species of moss from Plumas County, California.—*E. B. Chamberlain.*

MORPHOLOGY AND TAXONOMY OF FUNGI, LICHENS, BACTERIA AND MYXOMYCETES

H. M. FITZPATRICK, *Editor*

FUNGI

355. ANONYMOUS. [Rev. of: BLANC, GEORGES AND GABRIEL BRUN. [A further case of black-grain mycetoma (Madura Foot) in Tunisia.] Bull. Soc. Path. Exotique. Dec. 10, 1919.] Jour. Trop. Med. and Hygiene 23: 43-44. 1920.—Reports the seventh case found in Tunisia of Madura Foot. This is a mycetoma. The cause was found to be a fungus closely related to *Madurella tozeuri* Nicolle and Pinoy but differing in several characters and named accordingly *M. tabarkae*.—*E. A. Bessey.*

356. ANONYMOUS. [Rev. of: SMITH, THEOBALD. Mycosis of the bovine foetal membranes due to a mould of the genus *Mucor*. Jour. Exp. Med. 31: 115. 1920.] Jour. Comp. Path. and Therap. 33: 60-64. 1920.—A description of infection of foetal membranes of cattle due to a species of *Mucor* closely related to *M. rhizopodiformis*. On inoculation into rabbits, it caused their death.—*E. A. Bessey.*

357. ANONYMOUS. The species concept among fungi. [Rev. of: BRIERLY, W. B.—Trans. British Mycol. Soc. 4. Sept., 1919.] Nature 104: 708. 1920.—The author protests against specific descriptions based on growths as found in nature, especially for species on cultivated plants. The only exact method is by quantitative data derived from cultural treatment under standardized physico-chemical conditions.—*O. A. Stevens.*

358. BRIERLY, WILLIAM B. The fungal species. [Abstract.] Rept. British Assoc. Sci. 1919: 340-341. 1920.

359. CASTELLANI, ALDO. The etiology of thrush. Jour. Trop. Med. and Hygiene 23: 17-22. 1 pl. 1920.—The author claims that instead of the one fungus, *Oidium albicans* Robin, many fungi in the genera *Monilia*, *Oidium*, *Hemisporea*, *Willia*, *Endomyces*, and *Saccharomyces* may cause this disease. The generic differences are given. The clinical varieties of thrush are described, with the causal organism for each.—*E. A. Bessey.*

360. CASTELLANI, ALDO. Milroy lectures on the higher fungi in relation to human pathology. (Lecture I.) Jour. Trop. Med. and Hygiene 23: 101-110. Fig. 1-9. 1920.—A brief survey is given of the discovery of fungi pathogenic to man. The general classification of fungi is given and in particular that of the families containing such pathogens. Notes are given on physiology and on the use of sets of fungi for biochemical analysis.—E. A. Bessey.

361. CASTELLANI, ALDO. Milroy lectures on the higher fungi in relation to human pathology. (Lecture II.) Jour. Trop. Med. and Hygiene 23: 117-125. 10 fig. 1920.—The author discusses thrush, broncho-mycoses, tonsillo-mycoses, certain mycoses of the nervous system and organs of special sense, and certain mycoses of the urogenital system. A key is given to the physiological determination of the pathogenic *Monilia* species, showing their reaction to various carbohydrates, gelatin, litmus milk, etc.—E. A. Bessey.

362. CASTELLANI, ALDO. Milroy lectures on the higher fungi in relation to human pathology. (Lecture III.) Jour. Trop. Med. and Hygiene 23: 133-138. 2 pl., 6 fig. 1920.—The subjects treated are trichomycoses and dermatomycoses. The former affect only the hairs and may be caused by species of *Aspergillus*, *Penicillium* and *Nocardia*. The true dermatomycoses are very numerous and caused by a great variety of fungi, which are described in some detail.—E. A. Bessey.

363. CHALMERS, ALBERT J., AND NORMAN MACDONALD. Bronchomoniliasis in the Anglo-Egyptian Sudan and Egypt. Jour. Trop. Med. and Hygiene 23: 1-7. 1 pl. 1920.—The article discusses several types of bronchomycosis and the causal fungi. The latter were grown in culture and identified by the aid of cultural as well as morphological characteristics. The species concerned were *Monilia krusei*, *M. pinoyi*, and *M. pseudoguillermonti*. A discussion is given of the nomenclatorial history of the name *Monilia*.—E. A. Bessey.

364. CHIOVENDA, E. Nuova localita italiana per il *Myriostoma coliliforme* (Dicks.) Corda. [New station for *Myriostoma coliliforme* in Italy.] Nuova Gior. Bot. Ital., Nuova Ser. 27: 7-11. 1920.—*Myriostoma coliliforme* was collected in Ossola (Piemont) for the first time. The fungus was found growing in close association with the roots of *Polygonum persicaria*, forming with the latter an endotrophic relationship. Only once before, in 1902, has this fungus been observed in Italy.—Ernst Artschwager.

365. GARRETT, A. O. Some unique rusts. Utah Acad. Sci. 1: 132-136. 1918.—Paper presented to the Academy, April, 1915.—Review of recent work on life-history studies.—D. Reddick.

366. HEMMI, TAKEWO. Kurze Mitteilung über drei Fälle von Anthraknose auf Pflanzen. [Short report on three cases of anthracnose of plants.] Ann. Phytopath. Soc. Japan 13: 13-21. 1 pl., 5 fig. 1920.

367. KUNKEL, L. O. Further data on the orange rusts of *Rubus*. Jour. Agric. Res. 19: 501-512. Pl. D (colored) and 92-94. 1920.—Collections were made of the long-cycled rust, *Gymnoconia interstitialis*, and the short-cycled rust occurring on *Rubus* spp. about Washington, D. C. A study of these specimens has shown that the rust on the black raspberry is always long cycled while the rust on the blackberry and dewberry is always short cycled. Spores of the two rusts were germinated on water and Beyerinck agar at temperatures from 5° to 30°C. Spores taken from blackberry leaves always produced promycelia, while those from black raspberry leaves produced long germ tubes. Additional morphological differences in the two rusts were observed. The spores of the short-cycled rust are small, angular, and in mass cadmium orange, while the spores of *Gymnoconia* are larger, more regular, and in mass xanthine yellow. The author considers that a genetic relationship exists between the two rusts, since spores of the long-cycled species at times produce promycelia bearing sporidia. The occurrence of a suppressed short cycle in *Gymnoconia* leads him to believe that long-cycled rusts are the more primitive.—W. H. Burkholder.

368. NAMYSŁOWSKI, B. *État actuel des recherches sur les phénomènes de la sexualité des Mucorinées.* [The status of researches on sexuality in the Mucorineae.] *Rev. Gén. Bot.* 32: 193-215. 9 fig. 1920.—A summary of the results of experimental researches on reproduction and hybridization in this group of fungi. A bibliography of 34 titles is appended.—*L. W. Sharp.*

369. RICK, J. *Contributio ad monographiam Agaricacearum brasiliensium.* [Contribution toward a monograph of Brazilian agarics.] *Broteria (Ser. Bot.)* 18: 48-63. 1920.—This list contains 106 species and a few varieties, without citation of authorities except for new species, apparently all from the province of Rio Grande do Sul. In case of species already described, only a line or two of notes appear. In case of new species the descriptions are more complete. Of these the author says: "In this contribution many species are described whose identity with European species is quite probable, but not certain. I have therefore given a full description and a new name. At the same time I have indicated the old species with which the new is perchance identical." New species are proposed in *Lepiota*, *Hypholoma*, *Armillaria*, *Tricholoma*, *Collybia*, *Pluteolus*, *Eccilia*, *Clitopilus*, *Claudopus*, *Inocybe*, *Nauconia*, *Galera*, *Tubaria*, *Pilosace*, *Psilocybe*, and *Hygrophorus*. [See Bot. Absts. 6, Entry 204.]—*E. B. Chamberlain.*

370. THAXTER, ROLAND. *New Dimorphomycetaceae.* *Proc. Amer. Acad. Arts and Sci.* 55: 211-282. 1920.—The author discusses in general the unisexual forms of the Laboulbeniales and in particular the distinction between the genera *Dimeromyces* and *Dimorphomyces*. *Polyandromyces* is described as a new genus with one species and a variety as the known representatives. Eleven new species of *Dimeromyces* and fifty-one new species of *Dimorphomyces* are described.—*E. B. Payson.*

LICHENS

371. MOREAU, F. (M. ET MME.) *Recherches sur les lichens de la famille des Peltigéracées.* [Researches on lichens of the family Peltigeraceae.] *Ann. Sci. Nat. Bot.* X, 1: 29-138. 13 pl., 23 fig. 1919.—Authors are especially interested in reproduction of fungus of the lichen and in morphological influence of one symbiont on other. Their presentation is in three parts: (1) the fungus, (2) the alga, and (3) the alga-fungus complex. Authors emphasize mycelium as constituting colorless part of lichen. Underground or substratal mycelium is typical and generally neglected by students; authors call attention to occasional fusions among underground hyphae and to evidence for method of formation of septa. Typical mycelium appears also in the gonidial layer. Each cell is here described as having a single nucleus and metachromatic granules. In considering medullary region and pseudoparenchymatous region (plectenchyma), character of walls is emphasized. Authors refer to two kinds of reproductive bodies set free by *Peltigeraceae*; viz., spermatids and ascospores. They note that status of spermatids is uncertain. They found spermatids only in genus *Nephromium*, but did not make out fate of spermatids after being set free. Their studies showed that ascospore formation proceeds in absence of spermatids, and they deny to latter gametic functions. Ascospores an uncertain means of maintaining species, since a proper alga must be met when spore germinates. Soredia are certain to lead to new lichens. A consideration is next presented of beliefs of STAHL and BACHMANN, of FÜNFSTÜCK, and of DANGEARD concerning occurrence of sexual phenomena at formation of apothecia in fungi, and hypothesis of DANGEARD is favored.—Authors point out that the kind of alga (gonidia) whether of *Cyanophyceae* or *Chlorophyceae*, determines sub-generic groups in each of three genera of *Peltigeraceae*. Chlorophyceous *Peltigeraceae* may enclose *Cyanophyceae* in cephalodia. The authors point out necessity of pure culture methods in study of lichen algae.—Mutual relationships of alga and fungus studied in following exceptional formations which begin with algae in unusual positions: (a) tubercles resembling very large soredia on lower surface of thallus (displaced gonidia cause neighboring hyphae to assume special character); (b) soredial aberrations; (c) foliar ramifications of thallus, and (d) cephalodia formation due to action on hyphae of foreign alga.—Desirable further lines of study are mapped out at close.—*James P. Kelly.*

372. RIDDLE, L. W. Two publications on tropical American lichens. [Rev. of: (1) DE LESDAIN, BOULY. *Lichens de Mexique (États de Puebla et du Michoacan)* recueillis par le Frère Arsène Brouard. Brochure. *Pl. 1-31*. 1914. (2) WAINIO, EDVARD. *Additamenta ad Lichenographiam Antillarum illustrandam*. *Ann. Acad. Sci. Fennicae Ser. A*. 6: pt. 7. 1915.] *Bryologist* 23: 60-61. 1920.—The reviewer calls attention to these two publications, which contains many descriptions of new species, since neither seems likely to have a wide distribution. That upon Mexican lichens is a wholly independent publication; the other publication, reviewer states, is received in America only at the Smithsonian Institution.—*E. B. Chamberlain*.

BACTERIA

373. BOKURA, UMEÑOJO. A new bacterial disease of Gypsy-moth caterpillars. *Ann. Phytopath. Soc. Japan* 1³: 34-55. 1920.

374. CAUDA, A. Gruppi vegetali fissatori di azoto libero. [Plant groups that fix free nitrogen.] *Nuovo Gior. Bot. Ital.* 26: 169-178. 1919.—See *Bot. Absts.* 6, Entry 846.

375. GENTNER, G. Eine Bakteriose der Gerste. [A bacteriosis of barley.] *Centralbl. Bakt.* 50²: 428-441. 1920. [From *Absts. Bact.* 4: 292. 1920.]

376. PAILLOT, A. Sur le polymorphisme des Bactéries. [The polymorphism of bacteria.] *Compt. Rend. Acad. Sci. Paris* 170: 905-906. 2 fig. 1920.—Two bacilli which cause disease in caterpillars are described. When in the caterpillar they present various forms. It is suggested that polymorphism may in some cases be due to the effect of the tissues or liquids of the living host.—*C. N. and W. K. Farr*.

377. PETERSON, W. H., AND E. B. FRED. The fermentation of glucose, galactose, and mannose by *Lactobacillus pentoaceticus*. n. sp. *Jour. Biol. Chem.* 42: 273-287. 1920.—See *Bot. Absts.* 6, Entry 1338.

PALEOBOTANY AND EVOLUTIONARY HISTORY

E. W. BERRY, *Editor*

378. ADAMI, J. G. Medical contributions to the study of evolution. 8vo, 372 p. Macmillan and Co.: London, 1920. Price, \$7.25.

379. ANONYMOUS. Gymnospermic history. [Rev. of: SEWARD, A. C. *Fossil Plants: A text-book for students of botany and geology*. Vol. 4, Ginkgoales, Coniferales, Gnetales. xvi + 543 p. University Press: Cambridge, 1919.] *Nature* 105: 97-98. 1920. It is disappointing but perhaps not surprising that the work closes with this group. (See *Bot. Absts.* 3, Entry 2517.)—*O. A. Stevens*.

380. ANONYMOUS. [Rev. of: WIELAND, G. R. *Classification of Cycadophyta*. *Amer. Jour. Sci.* 47: 391-406. 1919. (See *Bot. Absts.* 3, Entry 1620.)] *Nature* 104: 509-510. 1920.

381. [B., F. O.] The origin of plant life on land. [Rev. of: CHURCH, A. H. *Thalassiophyta and the subaerial transmigration*. *Bot. Mem. No. 3*. 95 p. Oxford Univ. Press: London, 1919.] *Nature* 104: 624. 1920.—A real contribution full of originality and of interesting though bluff criticisms. The cautious philosopher would probably prefer greater elasticity of the thesis. Omits reference to the important discoveries of Lower Devonian fossils in the Rhynie-Chert and to question of transference of the tetral division in the course of descent to a fresh position in the life cycle.—*O. A. Stevens*.

382. BERRY, EDWARD W. **Fossil plants from the late Cretaceous of Tennessee.** Proc. Nat. Acad. Sci. [U. S. A.] 6: 333-334. 1920.—The Gulf Coastal Plain presents a comparatively complete paleobotanical record from the Cretaceous to the present. The two large gaps have been the late Upper Cretaceous and the Miocene. In 1919, in western Tennessee, Dr. Bruce Wade discovered abundant material in clay lenses of the Ripley formation—the latest Cretaceous of the region. Remains of 124 species (86 new) have been identified. The species are referred to 62 genera (30 extinct), 38 families, and 25 orders; 5 ferns, 6 gymnosperms, 7 monocotyledons, and 105 dicotyledons are included. "A complete account . . . will be published by the U. S. Geological Survey."—Howard B. Frost.

383. BERRY, EDWARD W. **Fossil plants.** [Rev. of: SEWARD, A. C. **Fossil plants.** Vol. IV. Cambridge Univ. Press: Cambridge, 1919.] Plant World 22: 341-342. 1919. "On the whole it seems to the reviewer that Professor Seward has performed a difficult task about as well as could be expected, and despite their obvious shortcomings, which have been freely criticised, these four volumes are a mine of information for the student interested in the floras of the past."—(Author's summary.)

384. BERRY, EDWARD W. **New specific name.** Torreyia 20: 101. 1920.—*Inga oligocaenica* Berry (Bull. U. S. Nat. Mus. 103: 32. 1918.) from the Oligocene of the Canal Zone is antedated by *Inga oligocaenica* Engelhardt (1898), from the Oligocene of Bohemia. The name *Inga culebrana* is accordingly proposed.—J. C. Nelson.

385. BERRY, E. W. **The ancestors of the sequoias.** Sci. Amer. Monthly 2: 207-208. 1920.—A reprint of an article which appeared in a recent number of Natural History. [See also Bot. Absts. 6, Entry 793.]—E. W. Berry.

386. BERRY, E. W. **The teaching of paleobotany.** Bull. Geol. Soc. Amer. 31: 389-392. 1920.—Outlines the content of a university course in paleobotany.—E. W. Berry.

387. BERRY, E. W. **The age of the Dakota flora.** Amer. Jour. Sci. 50: 387-390. 1920.—Discusses the age of the flora found in the Dakota sandstone of the western United States and shows that it cannot be Lower Cretaceous in age. The thesis is maintained that the Dakota sandstone is intimately associated with the Upper Cretaceous marine transgression of the Benton and is probably Turonian in age.—E. W. Berry.

388. CARPENTIER, A. **Contribution a l'étude des fructifications du Culm de Mouzeil (Loire-Inférieure).** [Contribution to the study of the fructifications from the Culm of Mouzeil.] Rev. Gén. Bot. 32: 337-350. 2 pl., 5 figs. 1920.—The basin of the Basse-Loire consists of two SE-NW synclines, known respectively by the names of Ancenis and Teillé-Mouzeil. Fossil plants of this region were described by Brongniart, but the fructifications of the Pteridospermae were made known chiefly by Grand'Eury and Bureau. The author has studied further the imprints of fructifications found here.—On the whole the Culm flora is less rich in genera and species than the Westphalian flora of the coal basin of Valenciennes. Among the most common impressions are those of *Sphenopteris Dubuissoni*, *S. elegans*, and *S. dissectum* (Brongt.). The Neuropterideae are rare: the genus *Neuropteris* is represented only by a few fragments of *N. antecedens* and *N. Schlehani*. The Lepidodendreae, including *Lepidodendron lycopodioides*, *Lepidophlois laricinus*, and *Ulodendron*, are fairly common.—Descriptions are given of the following seeds, with or without cupules: *Lagenospermum tenuifolium* Nathorst g., (*E. Bureau* sp.), associated with *Neuropteris antecedens* Stur and a *Sphenopteris*; *L. crassum* n. sp., associated with *Sphenopteris Dubuissoni* Brongt.; *L. inflatum* n. sp., possibly representing the escaped seeds of the cupule known as *L. crassum*; *L. aff. nitidulum* (Heer) Nathorst, associated with *Sphenopteris dissectum* and one other species; *L. sp.*; *Carpolithus* L. (cf. *Rhabdocarpus turbinatus*) E. Bureau sp.; *C. sp.* Three types of microsporangia are described: *Telangium* sp., associated with *Sphenopteris Dubuissoni*; *Pterispermothecka* n. gen.; Cf. *Diplothea* (*D. stellata* Kidston). Two uncertain impressions, one of them known as *Guilielmites*, are also mentioned.—L. W. Sharp.

389. CHANEY, RALPH W. *The flora of the Eagle Creek formation.* Cont. Walker Mus. 2⁵: 115-182. Pl. 5-22. 1920.—The paucity of described fossil floras from the Pacific coast region renders this an important contribution. The Eagle Creek flora, as described in this contribution, comprises 72 species, of which 38 are described as new and referred to the genera *Equisetum* (?), *Picea* (?), *Pinus*, *Cyperacites*, *Sabalites*, *Smilax*, *Phyllites*, *Populus*, *Myrica*, *Hicoria*, *Juglans*, *Alnus*, *Betula*, *Corylus*, *Castanea* (?), *Fagus* (?), *Quercus*, *Ulmus*, *Liriodendron*, *Magnolia*, *Laurophyllum*, *Liquidambar*, *Crataegus*, *Prunus*, *Cercis*, *Leguminosites*, *Acer*, *Tilia*, *Nyssa*, *Frazinus* (?), and *Carpolithus*. These all appear to be well founded except the *Liriodendron*. The local sections where the fossils were found along the present Columbia River gorge, the composition, physical environment, ecology and correlation of the flora are fully and satisfactorily discussed.—The Eagle Creek formation is entirely volcanic in origin and stream laid. It is considered, on the basis of the intermediate character of the flora between known upper Eocene and Miocene floras, to be of Oligocene age. The flora, which is largely dicotyledonous, shows a striking resemblance to the mixed hardwood flora of the eastern United States—this resemblance extending to even the relative representation of the families, the only departures being a shortage of Salicaceae and Rosaceae and an excess of Fagaceae and Hamamelidaceae. Oaks are the most abundant forms, both individually and specifically. Maples and elms are also prominent elements. The flora is considered to represent two principal distinct ecological types; namely, xerophytes that are thought to have grown on the water poor ridges and uplands, and the contemporaneous mesophytes of the well-watered valley bottom and sides.—*E. W. Berry.*

390. DE LA VAULX, R., AND P. MARTY, avec introduction de PH. GLANGEAUD. *Nouvelles recherches sur la flore fossile des environs de Varennes (Puy-de-Dôme).* [New researches on the fossil flora of the vicinity of Varennes.] Rev. Gén. Bot. 32: 282-300, 327-336, 351-368. 3 pl., 2 fig. 1920.—A study of the fossil flora of three fossiliferous beds in one of the volcanic regions of France, based on a critical examination of the material described by BOULAY (Flore Pliocène du Mont-Dore, Paris 1872) and on new collections. The paper is prefaced by a brief account of the stratigraphy of the region by PH. GLANGEAUD, who agrees with BOULAY in assigning the beds in question to the upper Miocene or lower Pliocene. The list of fossil trees, shrubs, and herbs now reported from this locality comprises 47 forms representing 23 families; 37 of them have been specifically determined. The following 14 are newly discovered by the authors: *Ginkgo biloba* Kaempf., *Sparganium* sp. *Celtis Japcti* Ung., *Lauris nobilis* L., *Carya minor* Sap. et Mar., *Paeonia mouton* Sims., *Myriophyllitis* sp., *Cercis siliquastrum* L., *Raphiolepis indica* Lindl., *Bumelia Rieufi* Marty, *Fraxinus oregona* Nutt., *Ilex decidua* Walt., *Ilex balearica* Desf., and *Rosa Glangeaudi* Marty. A list of about 50 species of diatoms is also included.—After a discussion of the palaeontological and geological evidence the authors conclude that the fossil flora of Varennes was buried during the Mio-Pliocene in the sediments of a lake into which volcanic ashes were thrown. This flora was continental, montane, and temperate, less than one-tenth of the species being sub-tropical. The mean temperature in this region during the Mio-Pliocene was probably from 12° to 14°C. Since that time some of the elements of the flora have migrated 5 geographical degrees southward.—Bibliography of 67 titles.—*L. W. Sharp.*

391. GALIPPE, V. *Recherches sur la résistance des microzymas à l'action du temps et sur leur survivance dans l'ambre.* [The longevity of microzymas and its survival in amber.] Compt. Rend. Acad. Sci. Paris 170: 856-858. 1920.—A microscopic examination of amber after dissolving in ether reveals the presence of microzymas and of ovoid and rod-shaped bacilli.—*C. N. and W. K. Farr.*

392. LULL, R. S. *Organic evolution.* 8vo, 729 p. The Macmillan Co.: New York, 1920. Price, \$3.25.

393. MACFARLAND, J. M. *The causes and course of organic evolution.* 8vo, 875 p. The Macmillan Co.: New York, 1920. Price, \$4.00.

394. METCALF, MAYNARD M. Upon an important method of studying problems of relationship and of geographical distribution. Proc. Nat. Acad. Sci. [U. S. A.] 6: 432-433. 1920.—A family of "frogs," the Leptodaetylidae, occurs in tropical and south-temperate America, and elsewhere only in Australia and Tasmania. This fact has been explained as a result of former land connection or as a result of convergent or parallel evolution. In both continents, however, the Leptodaetylidae have parasites of the genus *Zelleriella*, "and the Australian *Zelleriellas* so closely resemble the American forms that it is difficult to separate them specifically." Since it is extremely improbable that both host and parasite have evolved so similarly on distant continents, the hypothesis of former land connection is held to be definitely confirmed. This procedure of considering together the distribution of host and parasite is strongly recommended, as promising definite solution of various problems of phylogeny, migration, etc., with both animals and plants.—Howard B. Frost.

395. T., E. N. Botany at the British Association. Nature 104: 520-521. 1920.

PHYSIOLOGY

B. M. DUGGAR, *Editor*

CARROLL W. DODGE, *Assistant Editor*

GENERAL

396. LINHART, G. A. A new and simplified method for the statistical interpretation of biometrical data. Univ. California Publ. Agric. Sci. 4: 159-181. 12 fig. 1920.—Describes graphic methods for determining the values of k and h in the fundamental equation,

$$y = ke^{-h^2x^2} \dots\dots\dots (1)$$

When $x = 0$, y will equal k . Therefore k may be defined as the probability of error zero and as the largest number of measurements of a given set having the same numerical value. Substitution of y_0 for k gives

$$\frac{y}{y_0} = e^{-h^2x^2} \dots\dots\dots (2)$$

By use of logarithms this may be transformed into the linear equation,

$$\log \left(2.303 \log \frac{y_0}{y} \right) = 2 \log x + 2 \log h \dots\dots\dots (3)$$

or

$$\log \left(\log \frac{y_0}{y} \right) = 2 \log x + 2 \log h - 0.3623 \dots\dots\dots (4)$$

Let $K = 2 \log h - 0.3623$, then

$$\log \left(\log \frac{y_0}{y} \right) = 2 \log x + K \dots\dots\dots (5)$$

This will be recognized as the equation to a straight line having a slope of 2 and intercept K , when $\log \left(\log \frac{y_0}{y} \right)$ is plotted as ordinate and $\log x$ as abscissa. The value of K being thus easily determined the value of h , the index of precision, may be calculated from

$$K + 2 \log h - 0.3623$$

and is

$$h = (10) \frac{K + 0.3623}{2} \dots\dots\dots (6)$$

The value of hx corresponding to the integral value 0.5 (*vide* probability integral table) is 0.4769. Then

$$x = 0.4769 (10)^{-\frac{K + 0.3623}{2}} \dots\dots\dots (7)$$

which gives the probable error of a single observation. The probable error of the mean is equal to the probable error of one observation divided by the square root of the total number of observations,

$$x_o = \frac{x}{\sqrt{n}} = \frac{0.4769}{\sqrt{n}} (10)^{-\frac{K + 0.3623}{2}} \dots\dots\dots (8)$$

In the case of skew frequency distributions the above equations do not strictly apply because of a preponderance of either positive or negative errors. For such cases the equation,

$$\frac{y}{y} = e^{-h^2 \left(\log \frac{m}{m_o}\right)^2} \dots\dots\dots (9)$$

is proposed. Here m represents the numerical value of any measurement and m_o the value of the geometric mean. This may be transformed into the equation,

$$\log \frac{y_o}{y} = 2.303 h^2 \left(\log \frac{m}{m_o}\right)^2 \dots\dots\dots (10)$$

or

$$\log \frac{y_o}{y} = K \left(\log \frac{m}{m_o}\right)^2 \dots\dots\dots (11)$$

Numerous examples of the use of the equations are given, in which the values obtained are compared with those computed by other methods.—*H. S. Reed.*

DIFFUSION, PERMEABILITY

397. PRIESTLEY, J. H. Root pressure. [Abstract.] Rept. British Assoc. Adv. Sci. 1919: 337. 1920.

WATER RELATIONS

398. HARRIS, F. S. The effect of soil moisture on the morphology of certain plants. [Abstract.] Utah Acad. Sci. 1: 65. 1918.

399. LIVINGSTON, BURTON E., AND RICHIRO KOKETSU. The water-supplying power of the soil as related to the wilting of plants. Soil Sci. 9: 469-485. 1920.—Plants of *Coleus blumei* and *Triticum sativum* grown in 12 mixtures of varying amounts of glass sand, clay loam, and humus, were allowed to wilt until permanent wilting was evident. Dry, unglazed porcelain cones ("soil points") were then thrust into the soil and the amount of water which they absorbed in a given length of time ("water-supplying" power of soil) was determined by removing and weighing. This amount for a 2 hour period was from 0.04-0.11 g. The average value was the same for both plants and practically the same for all 12 soils.—*W. J. Robbins.*

400. ZELLER, S. M. Humidity in relation to moisture imbibition by wood and to spore germination on wood. Ann. Missouri Bot. Gard. 7: 51-74. 1 pl., 5 fig. 1920.—The moisture contents of wood at various atmospheric humidities are presented, the temperature being held at 25°C. Graphs are given to illustrate the relation between water content and humidity, for sap and heart-wood of both longleaf and shortleaf pine. By testing at various humidities the moisture content of any one species of wood, it was possible to approximate the fiber-saturation point. The moisture-humidity curves of highly resinous samples illustrate the

water-proofing effect of resin—especially above 50 per cent humidity. The germination curve for spores of *Lenzites saepiaria* illustrates the fact that spore germination is greatly accelerated when the atmospheric humidity is high enough to maintain fiber saturation of the wood.—A humidor for maintaining constant humidity and temperature is described. It is provided with a dew-point apparatus for the determination of humidity, and a weighing device by means of which the samples can be weighed without opening the humidity chamber.—S. M. Zeller.

MINERAL NUTRIENTS

401. BOTTOMLEY, W. B. The growth of *Lemna* plants in mineral solutions and in their natural medium. Ann. Botany 34: 345-352. 1920.—*Lemna major* and *Lemna minor* cannot grow normally in Knop's or Detmer's solution, but the addition of certain organic substances to these solutions permits rapid and healthy growth. These organic substances essential to the metabolism of the plants are to be found in the water of the ponds in which the plants normally grow, and maintain the plants in health, although lack of sufficient quantities of nitrates and phosphates under these conditions acts as a limiting factor, retarding their rate of multiplication.—G. M. Armstrong.

402. DUGGAR, B. M. Hydrogen ion concentration and the composition of nutrient solutions in relation to the growth of seed plants. Ann. Missouri Bot. Gard. 7: 1-50. 7 fig. 1920.—For several years the author has been examining the effect of the reaction of the medium on growth in certain physiologically balanced nutrient solutions and has secured many data concerning the extent of change of the P_H value of the solution in which the plants have grown, as well as concerning growth relations with the variations in active acidity. Thus in this report of experimental work particular reference is not made to the proportions of the different salts involved in the nutrient solutions except as they may influence the active acidity. For this report four solutions were used, as follows: *Solution A* was a slight modification of Shive's solution, having the following partial volume-molecular proportions— KH_2PO_4 , 0.0180; $Ca(NO_3)_2$, 0.0052; $MgSO_4$, 0.0150; and "soluble ferric phosphate," 0.0044 gm. per liter. *Solution B* was an extreme modification of the Crone solution, having the following proportions of salts— KNO_3 , 0.00495; $CaSO_4$, 0.000726; $MgSO_4$, 0.000526; and "soluble iron phosphate," 0.125 gm. per liter; this is a four-salt solution having a higher proportion of iron than the usual nutrient solution. *Solution C* was the Livingston and Tottingham solution, modified by the addition of "soluble ferric phosphate" as in *Solution A*— KNO_3 , 0.0216; $Ca(H_2PO_4)_2$, 0.0026; and $MgSO_4$, 0.0150. It is assumed that the osmotic value of solutions *A* and *C* is approximately that of Shive's solution—1.75 atmospheres—while that of *Solution B* is much less.—The culture methods employed were essentially those described before. Seedlings of corn, field peas, and wheat were used. For the determination of active acidity the standard solutions and indicators suggested by CLARK AND LUBS were employed. The total green weight with the remains of the seed, or cotyledons, cut away was used as an index to growth. In this way the health and growth of the plant is most favorably expressed.—The experiments were conducted under a considerable range of environmental conditions. "Under the most favorable conditions, the three solutions mentioned above, without other modifications, may all yield excellent growth. Plants grown in *Solution B* are invariably a deeper green, presenting a finer appearance and the average of the growth quantities is higher for wheat and corn than in either of the other two solutions. In the unmodified *Solutions A* and *C*, the green weight of peas averages higher than in the unmodified *Solution B*." *Solutions A* and *C* contain a monobasic phosphate and should have a P_H value of about 4.5. Experience shows that *Solution B* varies in active acidity from P_H 5.4 to P_H 7.1; although it is frequently 6.6 to 7.1. "Culture solutions prepared with monobasic phosphates may, however, exhibit a hydrogen-ion concentration which is too high for . . . best growth under certain conditions, and especially is this true in the case of wheat." Solutions made with monobasic potassium or calcium phosphate, unless previously purified, may yield a P_H which is distinctly toxic. Correction to P_H 4.8 to 5.2 by means of NaOH or by use, in part, of a dibasic salt generally yields better growth. Under

conditions resulting in a high transpiration rate more alkaline solutions give better results. "Wheat, corn, and peas are sensitive in the order named to high hydrogen ion concentration."—"Usually the addition to *Solution B* of small amounts of dibasic potassium phosphate, of solid calcium carbonate, and of aluminum hydroxide has given increased yields, often considerably above that of the unmodified solution."—The results indicate in general that there is no "best" solution for the growth of any of the plants used for this work. When the P_H of the solution is considerably less than neutrality there is generally a tendency for this to be shifted toward the neutral point," depending upon the composition of the solution and upon the plant.—*S. M. Zeller*.

403. GREAVES, J. E. The antagonistic action of calcium and iron salts toward other salts as measured by ammonification and nitrification. *Soil Sci.* 10: 77-102. 20 fig. 1920.—See *Bot. Absts.* 7, Entry 451.

404. JOHNSTON, EARL S. Nutrient requirement of the potato plant. *Plant World* 22: 329-336. 4 fig. 1919.—Difficulty was experienced in securing uniform potato plants for the experiments. Cuttings from potato vines, and sprouts removed from tubers at an early stage of development were not satisfactory. Somewhat older sprouts which had well developed roots at time of separation were used. The nutrient solutions employed were made up to one atmosphere osmotic pressure with monobasic potassium phosphate, calcium nitrate, and magnesium sulphate. Roots showed a tendency to rot in the culture solution. The best growth was obtained in a three-salt solution in which the larger amount of the osmotic pressure was due to calcium nitrate.—*Chas. A. Shull*.

405. MOLLIARD, M. Influence d'une dose réduite de potassium sur les caractères physiologiques du *Sterigmatocystis nigra*. [The influence of an insufficient supply of potassium on the physiological characteristics of *Sterigmatocystis nigra*.] *Compt. Rend. Acad. Sci. Paris* 170: 949-951. 1920.—This is a comparison of cultures of *Sterigmatocystis nigra* containing potassium in an amount which insures optimum development and those which have the amount reduced. Full nutrient solutions contained 0.95 g. of KH_2PO_4 to 1000 cc. of water, the potassium-low solution contained 0.0119 g. It is found that in potassium-starved culture the increase in dry weight is much slower; the sugar consumed in 20 days is equal to that consumed in full nutrient solution in two and two-thirds days. The sugar consumed instead of giving rise to CO_2 gives rise to oxalic acid. There is an absence of conidia and black pigment and the rapid formation of a yellow pigment. A liquid is also produced which is soluble in the solutions and stains blue with iodine.—*C. H. Farr*.

406. PARKER, F. W., AND E. TRUOG. The relation between the calcium and the nitrogen content of plants and the function of calcium. *Soil Sci.* 10: 49-56. 1 fig. 1920.—A tabulation of data on the ash content and nitrogen content of crop plants shows a close correlation between the calcium content and nitrogen content. Potassium, phosphorus, and magnesium show no such relation. The important agricultural plants can be divided into those having a low calcium-nitrogen ratio and low lime requirement, and those having a high calcium-nitrogen ratio and a higher lime requirement. The calcium neutralizes the plant acids formed in protein metabolism.—*W. J. Robbins*.

METABOLISM (GENERAL)

407. ALLEN, E. R. On carbohydrate consumption by *Azotobacter chroococcum*. *Ann. Missouri Bot. Gard.* 7: 75-79. 1 fig. 1920.—With a knowledge of some of the defects of present experimental methods for the study of the physiology of *Azotobacter*, three improvements are suggested for cultures. They are (1) renewal of the energy source in order to increase growth and to produce more marked changes in the amounts of metabolic products; "(2) simultaneous determination of nitrogen and of residual carbohydrates at short intervals" so as to obtain "a more complete picture of the growth processes of *Azotobacter*;" and (3) "operations to facilitate experimental manipulation and possibly obtain even better

results from mechanical agitation." One experiment lacking in the second improvement is reported. "The results show that the rate of carbohydrate consumption in *Azotobacter* cultures does not proceed in a manner similar to the rate of increase in cell numbers predicted by Duclaux. . . . Indeed, the curves resemble the antipode of the Duclaux curve." The fact that the organism utilizes renewals of carbohydrates seems to contradict the idea that there is an accumulation of metabolic products which are toxic to growth. The production of such substances in very short intervals in cultures as slow-growing and as dilute as those used in this experiment seems unlikely.—S. M. Zeller.

408. ANONYMOUS. The red coloring matter of plant galls. [Rev. of: M. NIERENSTEIN. Trans. Chem. Soc. 115: 1328-1332. 1919.] Nature 104: 707. 1920.—Investigation of galls on British oak trees caused by *Dryophanta divisa* resulted in isolation of a red pigment to which the name of "dryophantin" was given. This was concluded to be a diglucoside of purpurogallin (the first to be found in nature) and of pathological origin. The author is of the opinion that the other so-called anthocyanins obtained from plant galls are not properly anthocyanins, but are related to "dryophantin," and he proposes to classify these under the name "gallo-rubrones." The reviewer considers the evidence insufficient clearly to establish the absence of anthocyan pigments.—O. A. Stevens.

409. ANONYMOUS. Scientific study of the sugar group. [Rev. of: ARMSTRONG, E. FRANKLAND. The simple carbohydrates and the glucosides. 3d ed. x + 239 p. Longmans, Green and Co.: London, 1919.] Nature 104: 526-527. 1920.—The chief import of the review is brought out in the quotation which follows, to the effect that the book "is something more than a new and revised issue; it is to all intents and purposes a new book. . . . Students of the sugar group will have access to a thoroughly satisfactory book."—O. A. Stevens.

410. BIBERFELD, JOHANNES. Ergebnisse der experimentellen Toxikologie. Teil II. Organische Substanzen. A. Alkaloide. [Experimental toxicology. Part II. Organic substances. A. Alkaloids.] Ergeb. der Physiol. 17: 1-362. 1919.

411. COSTANTIN, J. Physiologie de l'anthocyane et chimie de la chlorophylle. [Physiology of anthocyan and chemistry of chlorophyll.] Ann. Sci. Nat. Bot. X. 1: xxxviii-liv. 1919.—The author discusses the present status of the knowledge of anthocyan and chlorophyll. He refers to COMBES' work in 1913 in which a treatment of a yellow flavone pigment derived from *Vitis* with nascent hydrogen gave a substance said to have been anthocyan. The author states that the reverse process of oxidation of anthocyan gave yellow flavone. The work of WILLSTÄTTER confirmed COMBES' conclusions. Such work linked up with the problems concerning glucosides and COMBES' experiments with absorption of these in plants is referred to. The author calls attention to the belief of some that anthocyan results from an oxidation. This hypothesis is supported by the discovery that oxydase distribution parallels anthocyan distribution. PALLADIN made anthocyan one of his respiration pigments. WHELDAL's attempt to explain anthocyan production in *Antirrhinum* on a genetic basis is "curieuse" to the author, but he deems it preferable to BATESON's assumption of determinants. NICOLAS in 1919 suggested a study of green and purple plants of the same species in an attempt to re-solve contradictions in oxidation and reducing theories of anthocyan formation. NICOLAS found greater acidity in the red-leaved varieties and the formation of these organic acids locked up some oxygen, reducing therefore the respiratory quotient. The using up of oxygen therefore is not directly a result of anthocyan production. Chlorophyll is thought now to have the formula: $(C_{20}H_{30}OOC)[C_{31}H_{29}N_4Mg](COOH)(COOCH_3)$. Treatment with alcohol will produce a substitution of C_2H_5 for phytol group $C_{20}H_{39}$ and give WILLSTÄTTER's crystallizable chlorophyll.—James P. Kelly.

412. DANGEARD, P. A. La structure de la cellule vegetale et son metabolisme. [The structure of the plant cell and its metabolism.] Compt. Rend. Acad. Sci. Paris 170: 709-714. 1920.

413. FREE, E. E. Sugar metabolism in cacti. [Rev. of: SPOEHR, H. A. The carbohydrate economy of cacti. Carnegie Inst. Washington, Publ. 287. 1919.] Plant World 22: 308-309. 1919.

414. GATIN, C. L., AND M. MOLLIARD. Utilisation comparée de divers constituants de la membrane par le *Xylaria Hypoxylon* L. [The comparative utilization of various constituents of the cell wall by *Xylaria Hypoxylon* L.] Rev. Gén. Bot. 32: 216-225. 1920.—A study of the digestive action of a wood-destroying fungus (*Xylaria Hypoxylon*) on isolated constituents of the cell wall in aseptic cultures. The constituents under investigation were added to a mineral nutrient solution made up as follows: tap water, 100 cc.; potassium nitrate, 0.2 g.; ammonium phosphate, 0.05 g.; magnesium sulphate, 0.05 g. Glucose and starch were also used for comparison. Of all the substances tried, pectin was the most readily utilized by *Xylaria*; 1.633 g. were used in building up 0.693 g. dry weight of mycelium. Then followed in order xylose and glucose, mannogalactan of the carob, arabinose (about half as well used as pectin), starch, and xylane. Good growth was also obtained on corrozo and the mucilage of flax, whereas cherry gum was only slightly used, and gelose not at all. A further experiment showed lignin to be very readily utilized.—L. W. Sharp.

415. HAMMARSTEN, HAROLD. Quantitative Versuche über Cannizzaro's Reaktion bei der Kondensation der Acetaldehyde mit wässrigen Alkalien. [Quantitative experiments on Cannizzaro's reaction in the condensation of acetaldehyde by aqueous alkaline solution.] Ann. Chem. [Liebig] 420: 262-275. 1920.—Acetaldehyde was subjected to N/2 KOH, N/3 Ba(OH)₂, or buffer salt mixtures for periods ranging from 1 to 240 hours and at temperatures of 0°, 18°, and 50°C. At P_H 6.8 and 50° the aldehyde underwent CANNIZZARO'S reaction (simultaneous oxidation and reduction) to the extent of 2 per cent in 3 hours, with no formation of wax. The reaction extended to 3.8 per cent in 3 hours, with no wax formation, at P_H 9.6. At P_H 10.7 the CANNIZZARO reaction extended to 5.8 per cent of the aldehyde in 18.5 hours, with a yield of 10 to 20 per cent of wax. The CANNIZZARO reaction is quite insignificant, relative to the velocity of the aldol condensation; for the latter proceeds so rapidly that only very little acid or alcohol can be formed. The limited extent of the CANNIZZARO reaction at 50° is ascribed to condensation of acetaldehyde to acetaldol, the latter decomposing to crotonic aldehyde.—W. E. Tottingham.

416. LEGROUX, RENÉ, AND JOSEPH MESNARD. Vitamines pour la culture des bactéries. [Vitamines in the culture of bacteria.] Compt. Rend. Acad. Sci. Paris 170: 901-904. 1920.—It is found that certain globules are necessary for the growth and development of the bacilli of Pfeiffer (influenza).—C. H. and W. K. Farr.

417. MÜLLER, ERICH. Die Dehydroxydation der Aldehyde. Mechanismus ihrer Oxydation. [The dehydroxydation of aldehydes. Mechanism of their oxidation.] Ann. Chem. [Liebig] 420: 241-263. 1920.—Dehydroxydation is electrochemical or chemical oxidation of formaldehyde, acetaldehyde, and benzaldehyde in alkaline solution, with the production of gaseous hydrogen and an acid. Formaldehyde yields hydrogen by the action of certain metals which also accelerate the CANNIZZARO reaction (simultaneous oxidation and reduction). The results of experiments with CuO, Cu₂O and Ag₂O as catalysts are given. The mechanism of dehydroxydation in the case of acetaldehyde is supposed to proceed in two alternate ways, with the oxaldehyde as a primary product, as follows: (1) Acetaldehyde-water + electrical charge = oxyacetaldehyde + hydrogen ion. And (2) Oxyacetaldehyde + electrical charge = acetic acid + hydrogen ion. (The H-ion apparently functions in the reduction of aldehyde to alcohol.) Or (3) Oxyacetaldehyde + electrical charge + acetic acid + molecular hydrogen.—If reaction (3) is more rapid than (2) dehydroxydation occurs, and hydrogen appears.—W. E. Tottingham.

418. STRAND, E. [Rev. of: LIPSCHÜTZ, A. Pflanze und Tier. [Plant and animal.] 42 p., 8 fig. Theodor Thomas: Leipzig.] Arch. Naturgesch., Abt. A, 83, Heft 4: 209. 1919.—The author discusses the origin of the living substance of the plant and the formation of the living substance of the human body out of food.—C. E. Allen.

419. TOCHINAI, YOSHIHIKO. Studies on the food relations of *Fusarium lini*. Ann. Phytopath. Soc. Japan 13: 22-33. 1920.—The following substances were tested as sources of carbon: nine carbohydrates—viz., glucose, levulose, galactose, sucrose, maltose, lactose soluble starch, inulin, and arabin—in 2 per cent solutions; six organic acids—viz., malic, succinic, maleic, fumaric, racemic, and citric—in 1 and 0.1 per cent solutions; and glycerine, mannite, vanillin, thymol, and α -naphthol in 2 per cent solutions. The chemicals were added in the above indicated quantities to a standard nutritive solution prepared as follows, NH_4NO_3 , 1 g.; KH_2PO_4 , 0.50 g.; MgSO_4 , 0.25 g.; and redistilled water 1000 g. As sources of nitrogen, ammonium sulfate, sodium nitrate, potassium nitrate, peptone, and urea in 2 per cent solutions, and acetamide, succinamide, dicyandiamide, and asparagine in 1 per cent solutions were tested. Each chemical was added to a standard nutritive solution of the following composition: KH_2PO_4 , 0.50 g.; MgSO_4 , (crystal) 0.25 g.; cane sugar, 20 g.; and redistilled water 1000 cc. Results were checked at the end of two weeks growth. The carbohydrates tested gave the following dry weights in grams of mycelia: inulin 0.299; glucose 0.274; arabin 0.147; maltose 0.151; soluble starch 0.125; levulose 0.084; galactose 0.072; sucrose 0.044; and lactose 0.039. Organic acids as sources of carbon were unfavorable to the fungus, which could develop only in low percentages, such as 0.1 per cent. As indicated by the growth made, the organic acids may be arranged as follows in descending order: succinic, malic, citric, fumaric, maleic, and racemic. In the nutritive solution containing racemic acid the d-tartaric was more readily assimilated than the l-tartaric acid, as determined by the change in optical activity. Mannite was a favorable source of carbon, 0.24 g. (dry weight) of mycelium being produced, while glycerine gave but 0.024 g. The phenol derivatives prevented growth. Organic nitrogen compounds are far better sources of nitrogen than inorganic compounds, the dry weights of mycelium in grams being as follows: peptone 0.448; urea 0.251; sodium nitrate 0.198; ammonium phosphate 0.194; ammonium sulphate 0.038; and potassium nitrate 0.012. The amides are generally good sources of nitrogen for this fungus, the following dry weights in grams of mycelia being obtained: asparagine 0.288; acetamide 0.173; dicyandiamide 0.516; and succinamide 0.143.—*L. M. Massey.*

METABOLISM (ENZYMES, FERMENTATION)

420. ANDERSON, J. A., E. B. FRED, AND W. H. PETERSON. The relation between the number of bacteria and acid production in the fermentation of xylose. Jour. Infect. Diseases 27: 281-292. 1920.—The rate of growth of *Lactobacillus pentoceticus* was compared with its rate of acid production in the fermentation of xylose. Both the plate and the direct counting method of BREED were used for the counting of the bacteria. The volatile (acetic) and the nonvolatile (lactic) acids were determined. It was found that the acid production is most rapid during the period of maximum growth of the organisms, and a decline in the rate of growth is accompanied by a decrease in acid production. The bacterial numbers reach a maximum within 48 hours after inoculation, while the maximum acidity is found only after several days. In the presence of calcium carbonate, the bacteria multiply more rapidly and reach a higher number, accompanied by a more nearly complete fermentation.—*Selman A. Waksman.*

421. SHERMAN, H. C., I. D. GARARD, AND V. K. LA MER. A further study of the process of purifying pancreatic amylase. Jour. Amer. Chem. Soc. 42: 1900-1907. 1920.

ORGANISM AS A WHOLE

422. ANONYMOUS. The tenacity of prickly pear seedlings. Agric. Gaz. New South Wales 31: 571. 1920.—Prickly pear, *Opuntia* sps. seedlings without water remained alive for 12 months in an office.—*L. R. Waldron.*

423. CHEMIN, E. Observations anatomiques et biologiques sur le genre "Lathraea." [Anatomical and biological observations on the genus "Lathraea."] Ann. Sci. Nat. Bot. X. 2: 125-272. 1 pl., 88 fig. 1920.—See Bot. Absts. 7, Entry 319.

424. LOTKA, ALFRED J. *Analytical note on certain rhythmical relations in organic systems.* Proc. Nation. Acad. Sci. [U. S. A.] 6: 410-415. 1920.—A discussion of mathematical laws of some types of periodic phenomena. Certain applications of the laws of chemical dynamics indicate the occurrence of damped (transitory) oscillations, and only such were expected "in the absence of geometrical, structural causes." The author finds, however, that in certain cases his method indicates undamped oscillations. Consider a system in evolution, where species of matter (organic or inorganic) having the masses $X_1, X_2 \dots X_n$ are characterized by certain parameters Q and physically conditioned by other parameters P . "For a very broad class of cases, . . . the course of events in such a system will be represented by a system of differential equations of the form

$$\left. \begin{aligned} \frac{dX_i}{dt} &= F_i (X_1, X_2 \dots X_n; P, Q) \\ (i &= 1, 2 \dots n) \end{aligned} \right\}$$

The author here considers especially a simple case, that of the quantitative relations between a plant species and an animal species feeding upon it. Undamped oscillations in the abundance of the species are shown to result.—Howard B. Frost.

425. MOREAU, F. (M. AND MME.) *Recherches sur les lichens de la famille des Peltigéracées.* [Researches on lichens of the family Peltigeraceae.] Ann. Sci. Nat. Bot. X. 1: 29-138. 13 pl., 23 fig. 1919.—See Bot. Absts. 7, Entry 371.

426. PIETSCH, ALBERT. *Wie erklärt sich das lange Hängenbleiben der Blätter an einigen phanerogamen Holzgewächsen im Herbst 1919?* [What is the explanation for the late retention of the foliage of several phanerogamous woody plants in the fall of 1919?] Naturwiss. Zeitschr. Forst-u. Landw. 18: 150-155. 1920.—See Bot. Absts. 7, Entry 140.

GROWTH, DEVELOPMENT, REPRODUCTION

427. BERNBECK. *Das Wachstum im Winde.* [Growth and wind.] Forstwiss. Centralbl. 42: 27-40, 59-69, 93-100. 1920.—See Bot. Absts. 7, Entry 113.

428. BURNS, GEORGE P. *Eccentric growth and the formation of redwood in the main stem of conifers.* Vermont Agric. Exp. Sta. Bull. 219. 10 pp., 4 pl., 10 fig. 1920.—See Bot. Absts. 7, Entry 318.

429. HARVEY, E. N. *An experiment on regulation in plants.* Amer. Nat. 54: 362-367. 1 fig. 1920.—An analysis of factors retarding lateral outgrowths of plants. The author recalls the already known facts that growing stem tip or apical bud has inhibitory influences on lower latent buds and that active root inhibits growth of others above it. He reports an experiment to support the idea that regulatory influence of one part over another in plants is not due to transport of materials. The author thinks that it is dependent on living protoplasts in the organism whose selective permeability leads to an electrical polarity that determines the biological polarity of the organism.—J. P. Kelly.

430. REED, H. S. *The dynamics of a fluctuating growth rate.* Proc. Nation. Acad. Sci. [U. S. A.] 6: 397-410. 3 fig. 1920.—This is a study of the growth rate of a selected lot of shoots on young apricot trees, with reference not only to the type of growth, but also to the intraseasonal periodicity of growth. The growth rate exhibited its greatest velocity in the early part of the growing season and declined as the season advanced, exhibiting three intraseasonal cycles of growth. The growth during each cycle is expressed by the formula of autocatalysis,

$$\log \frac{x}{a-x} = K(t-t_1)$$

The growth rate for the entire season conforms to that of a chemical reaction consisting of two unimolecular reactions, one of which alternately accelerates and retards the other,

$$x = 210 [1 - e^{-.095(t-1)}] + 19.1 \left[e^{-.055t} \cos \frac{\pi}{14} t \right]$$

If growth be assumed to be proportional to the amount of active catalyst present, a method is available for studying the dynamics of the growth process.—*H. S. Reed.*

MOVEMENTS OF GROWTH AND TURGOR CHANGES

431. JACCARD, P. Inversion de l'excentricité des branches produite expérimentalement. [The experimental inversion of the eccentricity of branches.] *Rev. Gén. Bot.* 32: 273-281. 2 pl., 1 fig. 1920.—Many authors have considered the eccentric growth of the lateral branches of trees to be the result of the polarizing action of a geotropic excitation having its seat in the terminal portion, and have therefore called the wood of the larger side "geotropic wood." If growing branches are tied in the form of a circle with the upper face on the inside, thus reversing the usual tension-compression relation of the upper and lower faces, a reversal of the eccentricity occurs. The eccentricity is therefore due to the mechanical action of weight (tension and compression) on the growing tissues, and not to a geotropic excitation. This conclusion is supported by the behavior of plants kept for some months on a large clinostat. Here also the eccentricity is reversed; because of a slight centrifugal force (1/20 gravity) developed by the clinostat, the upper face of the branch is more strongly compressed during one half of the rotation than is the lower face during the other half. The same stimulus, such as longitudinal compression, accelerates wood formation in some species and retards it in others. Conifers and dicotyledons differ in this respect. The increase in the thickness of the wood on one side compensates for a decrease on the other; eccentricity involves no absolute increase in the mass of woody tissue in a given length of the branch.—*L. W. Sharp.*

GERMINATION, RENEWAL OF ACTIVITY

432. ANONYMOUS. Notes and comments. *Australian Nat.* 4: 160. 1920.—A seed germinating in one year instead of the usual two.—*T. C. Frye.*

433. LESAGE, P. Contributions a l'étude de la germination des spores de mousses. [Germination of moss spores.] *Compt. Rend. Acad. Sci. Paris* 166: 744-747. 1918.—The author shows that the spores of certain mosses are capable of germination after being dried for periods of from 3 to 7 years. In the case of *Funaria hygrometrica*, which proved an especially good species for experimental purposes, he found that the optimum temperature for germination was between 21 and 22°C.; that darkness retarded the germination; and that spores sown in distilled water germinated better if the vessels of distillation were glass rather than copper.—*A. W. Evans.*

TEMPERATURE RELATIONS

434. COVILLE, FREDERICK V. The influence of cold in stimulating the growth of plants. *Proc. Nation. Acad. Sci. [U. S. A.]* 6: 434-435. 1920.—The attainment of winter dormancy by trees and shrubs is not dependent upon exposure to cold. Experiments with controlled temperatures further indicate that a period of chilling is necessary for normal resumption of growth in the spring; in plants kept warm throughout the winter, the spring growth is delayed and abnormal. Exposure to cold results in transformation of stored starch to sugar, with the consequent development of high osmotic pressures.—*Howard B. Frost.*

435. MATISSE, G. Action de la chaleur et du froid sur l'activité des êtres vivants. [Action of heat and cold upon the activity of living organisms.] ii + 556 p., 175 fig. Emile Larose: Paris, 1919.—According to the author he has attempted in this work to correlate the viewpoint

of the physical sciences with that of physiology. He assumes that the organism is not the sum of the functions of its organs, and that it is important to study the reactions of the organism complete. His experiments are intended to be in this direction. While drawing something from botanical material in the historical discussion, the experiments are based largely on animal forms.—*B. M. Duggar.*

RADIANT ENERGY RELATIONS

436. ASTON, B. C. Radio-active fertilizers and plant growth. *New Zealand Jour. Agric.* 20: 172-173. 1920. See *Bot. Absts.* 7, Entry 457.

437. BLACKMAN, V. H. Radioactivity and normal physiological function. *Ann. Botany* 34: 299-302. 1920.—The writer presents a brief résumé of H. Zwaardemaker's researches dealing with the radio-activity of certain substances in relation to physiological function. Though the results here obtained are primarily of fundamental importance to animal physiology, their probable application to plant physiology is indicated.—*R. W. Webb.*

TOXIC AGENTS

438. BERTRAND, GABRIEL. Action de la chloropicrine sur les plantes supérieures. [The effect of chloropicrine on the higher plants.] *Compt. Rend. Acad. Sci. Paris* 170: 858-860. 1920.—Concentrations of chloropicrine of 200 g. or less per cubic meter were tried on trees and shrubs. This concentration was reduced progressively in an attempt to find the minimal effect. Twelve to twenty grams gave the same effect as is found in autumnal coloration and abscission. Two to three grams gave an effect similar to frost or anesthetics. A still smaller amount caused the leaves to fall off without change of color or alteration in turgescence. It was found that young leaves were less sensitive than herbaceous. It is suggested that chloropicrine might be found valuable in ridding plants of their leaf parasites.—*C. H. and W. K. Farr.*

439. BERTRAND, GABRIEL. Des conditions qui peuvent modifier l'activité de la chloropicrine vis-à-vis des plantes supérieures. [The conditions which frequently modify the effect of chloropicrine upon the higher plants.] *Compt. Rend. Acad. Sci. Paris* 170: 952-954. 1920.—In this study leafy shoots of eight species of trees were used. Concentrations were tried between from 1 to 200 g. per cubic meter for periods of from 10 to 60 minutes. The effect is about the same, providing the product of time and concentration is the same. Humidity does not seem to alter the effect, nor is temperature a very important factor.—*C. H. Farr.*

440. MEDES, GRACE AND J. F. McCLENDON. The effect of anesthetics on living cells. *Proc. Nation. Acad. Sci. [U. S. A.]* 6: 243-246. 1920.—Certain anesthetics were applied to animal cells (*Cassiopea*) in sea water and to plant cells (*Elodea*) in a solution of NaHCO_3 in distilled water. The effects differed with the organism and the anesthetic employed, and with the particular cell activity or property considered. In the case of *Elodea*, four anesthetics—alcohol, ether, chloroform, and chloretone—all increased respiration and permeability, but decreased photosynthesis; while they sometimes increased and sometimes decreased protoplasmic rotation.—*Howard B. Frost.*

PHYSIOLOGY OF DISEASE

441. JODIDI, S. L. A mosaic disease of cabbage as revealed by its nitrogen constituents. *Jour. Amer. Chem. Soc.* 42: 1883-1893. 1920.—This disease is characterized by denitrification taking place in the affected tissues. The nitrates are, in part, reduced to ammonia, which is lost; and, in part, to nitrites. The latter reacts on the ammonia group of various organic compounds and brings about the elimination of elementary nitrogen.—*J. M. Brannon.*

442. JODIDI, S. L., S. C. MOULTON, AND K. S. MARKLEY. The mosaic disease of spinach as characterized by its nitrogen constituents. *Jour. Amer. Chem. Soc.* 42: 1061-1070. 1920.—The author finds that the lower nitrogen content of the diseased tissues may safely be considered as one of the striking characteristics of the mosaic disease of spinach. The leaves of the normal plants have higher nitric-nitrogen content than the blighted spinach. The difference in nitrate content of healthy and blighted root is slight. The higher ammonia content and presence of nitrites may be said, also, to be characteristic of spinach blight. The diseased plants were found capable of building up proteins. The leaves of the diseased plants have a smaller proportion of acid amide, basic, and non-basic nitrogen, but a larger proportion of peptide and protein nitrogen than the corresponding normal tissues. It is because of these findings—together with the difference in total nitrate, nitrite, and ammoniacal nitrogen content already reported—that we logically and forcibly come to the conclusion that the pathological condition is brought about by the process of denitrification which takes place in the spinach tissues.—*J. M. Brannon.*

MISCELLANEOUS

443. GALIPPE, V. Recherches sur la résistance des microzymas à l'action du temps et sur leur survivance dans l'ambre. [The longevity of microzymas and its survival in amber.] *Compt. Rend. Acad. Sci. Paris* 170: 856-858. 1920.—See Bot. Absts. 7, Entry 391.

444. HAMBLIN, C. O. To infect lucerne seed with nodule organisms. *Agric. Gaz. New South Wales* 31: 466. 1920.—See Bot. Absts. 7, Entry 30.

445. T., E. N. Botany at the British Association. *Nature* 104: 520-521. 1920.

446. THOMPSON, LEONARD R. Advantages of solid paraffin for sealing anaerobic fluid cultures. *Jour. Infect. Diseases* 27: 240-244. 1920.—A method is described for sealing tubes with solid paraffin. A greater percentage of positive growths with stock anaerobic cultures has been obtained than with parallel tubes sealed with liquid paraffin.—*Selman A. Waksman.*

SOIL SCIENCE

J. J. SKINNER, *Editor*

F. M. SCHERTZ, *Assistant Editor*

ACID SOILS

447. HARTWELL, BURT L., AND F. R. PEMBER. The effect of dicalcium silicate on an acid soil. *Soil Sci.* 10: 57-60. 1920.—Pot experiments on an acid soil show that the beneficial effect of "dicalcium silicate" on the growth of lettuce is due to its neutralizing effect. "Dicalcium silicate" and "hydrated silica" do not appear to be of benefit because of their silicon content.—*W. J. Robbins.*

448. MARTIN, W. H. The relation of sulfur to soil acidity and to the control of potato scab. *Soil Sci.* 9: 393-409. 1920.

449. MIRASOL, JOSE JISON. Aluminum as a factor in soil acidity. *Soil Sci.* 10: 153-217. 12 pl. 1920.—Experiments were performed to determine the effect of aluminum salts alone or in combination with calcium carbonate or with acid phosphate on the growth of sweet clover in sand; the effect of limestone and acid phosphate on the acidity and productivity of soil; the effect of the removal of some aluminum from the soil on the growth of sweet clover and whether iron and manganese are factors in the acidity of the soils investigated. Aluminum salts were highly toxic to sweet clover when applied in amounts chemically equivalent to the acidity of the soil and fatal in amounts five times the acidity of the soil. Calcium carbonate or acid phosphate decreased or eliminated the toxicity of aluminum salts. Aluminum hydroxide was not toxic. Both limestone and acid phosphate reduced the acidity of

the soil and increased the crop yield. The reduction in acidity is due to the formation of insoluble aluminum salts. Leaching soil with potassium nitrate until the leachings are neutral removes as much as 59 per cent of the aluminum, reduces the acidity 99 per cent, and improves the growth of sweet clover. Iron and manganese are apparently not important factors in the soils studied.—*W. J. Robbins.*

450. SHEDD, O. M. A proposed method for the estimation of total calcium in soils and the significance of this element to soil fertility. *Soil Sci.* 10: 1-14. 1920.—A rapid and accurate method for the determination of total calcium in soils is described. The total calcium content of some Kentucky soils is so low that their deficiency in this substance is important, as well as is the deficiency in phosphorus and nitrogen. Cultivation causes a loss in calcium. The best soil types contain the most calcium; the poorest, the least. A ton of limestone or rock phosphate per acre may add more calcium than is already present.—*W. J. Robbins.*

INFLUENCE OF BIOLOGICAL AGENTS

451. GREAVES, J. E. The antagonistic action of calcium and iron salts toward other salts as measured by ammonification and nitrification. *Soil Sci.* 10: 77-102. 20 fig. 1920.—A determination was made of the ammonification and nitrification of dried blood in soil in tumblers to which salts in fractions of gram molecules were added. True antagonism as measured by ammonification was found between calcium sulphate, and sodium carbonate, sodium nitrate, sodium sulfate, calcium chloride, magnesium chloride, and magnesium sulphate. The same is true of nitrification with the exception of sodium sulphate and calcium chloride and calcium sulfate. With some exceptions, the sulphate, chloride, carbonate, and nitrate of iron were found to antagonize the salts of sodium, calcium, and magnesium. Iron carbonate reduced the toxicity of magnesium sulphate to ammonification 75 per cent, and iron nitrate increased the nitrification in the presence of magnesium chloride 420 per cent. The quantity of iron required for maximum effect varies with the iron compound and the specific alkali.—*W. J. Robbins.*

452. GREAVES, J. E. The influence of arsenic upon the biological transformation of nitrogen in soils. (Abstract.) *Utah Acad. Sci.* 1: 128-129. 1918.—Complete paper published in *Biochem. Bull.* 3: 2-16. 1913.

453. PETERSON, E. G., AND E. MOHR. Nitrogen fixation by bacteria in Utah soils. (Abstract.) *Utah Acad. Sci.* 1: 97-98. 1918.

454. NELLER, J. R. The oxidizing power of soil from limed and unlimed plots and its relation to other factors. *Soil Sci.* 10: 29-39. Fig. 1, pl. 1. 1920.—The carbon dioxide evolution, and nitrate and ammonia production, from added organic matter were determined for soil samples from plots which have been cultivated for more than ten years under limed and unlimed conditions. Nitrate accumulation and bacterial numbers were higher on the limed than unlimed soil, but the ammonia accumulation was about the same. The average crop yield for the past ten years varies closely with the present oxidizing power.—*W. J. Robbins.*

455. ROBBINS, WILLIAM J., AND A. B. MASSEY. The effect of certain environmental conditions on the rate of destruction of vanillin by a soil bacterium. *Soil Sci.* 10: 237-246. 1 fig. 1920.—Studies in solution cultures containing nutrient salts show that the destruction of vanillin by a soil bacterium is favored by aeration and inhibited by slight concentrations of hydrochloric acid. In mixtures of sodium nitrate, potassium sulfate, and calcium acid phosphate, the destruction of vanillin is most rapid in the cultures high in phosphate and least rapid in cultures high in sulfate. The number of species capable of destroying vanillin is limited.—*W. J. Robbins.*

456. SINGH, THAKUR MAHADEO. The effect of gypsum on bacterial activities in soils. *Soil Sci.* 9: 437-468. 1920.—Determinations were made of the effect of calcium sulphate, calcium carbonate, or combinations of the two on the ammonification of dried blood, nitri-

fication of ammonium sulfate, fixation of nitrogen, fixation of nitrogen by *B. radicicola*, and yield of plants. Ammonification was decreased by gypsum and by mixtures of lime and gypsum. Nitrification was decreased by calcium sulphate but increased by calcium carbonate and gypsum together. Nitrogen fixation was stimulated by 100 pounds per acre of gypsum, but larger amounts had less stimulative effect. The yield and potassium content of red clover was increased by 1000 pounds of gypsum per acre, but other leguminous crops or wheat were not affected. Gypsum increased the soil acidity and, in some cases, the amount of soluble potassium.—*W. J. Robbins.*

FERTILITY STUDIES

457. ASTON, B. C. Radio-active fertilizers and plant growth. New Zealand Jour. Agric. 20: 172-173. 1920.—A brief review of work in England and America.—*N. J. Giddings.*

458. HARRIS, F. S. Effect of soil alkali on plant growth. (Abstract.) Utah Acad. Sci. 1: 131-132. 1918.

459. LEININGEN-WESTERBURG (GRAF ZU.) Rauchschiiden und einschlagige bodenkundliche Fragen. [Smoke injury and related matters of soil science.] Forstwiss. Centralbl. 42: 18-93. 1920.—There is a close relation between soil composition and quality, and the damage which may result to vegetation from various fumes and dusts. Smoke damage to plants is usually indirect, as the effect of the fumes is on the soil and humus. Lime is especially necessary in soils exposed to acid fumes, and should be added in the cheapest way possible where soils are poor in lime; otherwise the acids will remove all the lime present. This applies both to open and to forest lands. It has been computed that in the vicinity of Stolberg (Rhine province) approximately 800 grams of sulphuric and hydrochloric acids are deposited annually per square meter of soil. Lime also combines with poisonous zinc, copper, iron, and mercury salts and renders them harmless to plants, but has little or no effect on arsenic compounds. Some of these compounds in small quantities stimulate plant growth, but in large quantities hinder or destroy it. Dust from lime, cement, or magnesite ovens, etc., may act as a fertilizer, or if in too great volume and not occasionally harrowed into the soil may form a crust which will injure vegetation. Soot does not in itself injure plants, but does so indirectly by sticking on the foliage and adsorbing poisonous gases from the air. In case of many substances, such as calcium, magnesium, chlorine, fluorine and sulphur compounds, which are already present in soil not exposed to smoke, it is difficult to determine the amount of injury due to fumes, since chemical analysis of the plants will not show the origin of the poisons they may contain.—*W. N. Sparhawk.*

460. MCCOOL, M. M., AND C. E. MILLAR. The formation of soluble substances in soils taken from widely separated regions. Soil Sci. 10: 219-235. 1 fig. 1920.—Samples of air-dry soils were leached with distilled water until the freezing-point depression of the soil was zero. The soil was then incubated at 25°C., and the freezing-point lowerings were determined after 5, 10, 30, and 60 days. Sub-soils and new soils formed soluble salts very slowly. New soils are less active than somewhat older soils, and aged soils are almost inert. Soils from acid regions were not more soluble than those which had weathered more. The formation of soluble material increased with grinding and with treatment with sodium nitrate.—*W. J. Robbins.*

461. NIKLAS, H. Ubersicht uber Bayerns Bodenverhaltnisse. [Summary of Bavarian soil conditions.] Forstwiss. Centralbl. 42: 123-135. 1920.—The author discusses the construction of a general soil map for Bavaria, based on the prevailing crops grown. Complete soil surveys are lacking. Soils may be classified according to climatic conditions, geological origin, or to texture. For practical purposes the latter classification is the best, both for agriculture and for forestry. The 434 districts of Bavaria are classified in 7 soil groups as follows: (1) very heavy; (2) heavy; (3) medium; (4) heavy and light; (5) light and medium; (6) light, and (7) meadow soils due to climatic conditions regardless of texture.—(1) This group comprises 13 per cent of the total area of Bavaria, and grows principally wheat and

grass; (2) 12 per cent, and grows wheat and barley; (3) 14 per cent, growing barley, (4) and (5) 17 per cent; (6) 31 per cent, and (7) 13 per cent. The lighter soils grow principally rye and oats. The value of such a map is discussed.—*W. N. Sparhawk.*

462. PARKER, F. W., AND E. TRUOG. The relation between the calcium and the nitrogen content of plants and the function of calcium. *Soil Sci.* 10: 49-56. *Fig. 1.* 1920.—See *Bot. Absts.* 7, Entry 406.

463. ROBERTS, GEORGE, AND A. E. EWAN. I. Report on soil experiment fields. II. Maintenance of fertility. *Kentucky Agric. Exp. Sta. Bull.* 228: 89-131. 1920.—Results are reported from eight experiments fields on as many different soil areas of the state, ranging over periods of four to nine years. The requirements for phosphorus, potassium, nitrogen, and limestone were determined, and a comparison was made of acid phosphate and rock phosphate on limed and unlimed soil. The rotation employed in most cases is corn, soy beans, wheat, and clover. None of the treatments give any material increase in crops on the Lexington field, representing the highly phosphatic soils of the Central Blue Grass region. On all the soils represented by the other fields, limestone and phosphates give very large increases. The returns from potassium salts in connection with phosphates or in connection with phosphates and limestone give little or no increase in yields. Nitrate of soda gives practically no increase for corn, but gives small or medium increases for wheat and tobacco. In the comparison of acid phosphate and rock phosphate at the average annual rate of 200 pounds per acre of 16 per cent acid phosphate and 400 pounds per acre of 32 per cent rock phosphate, the rock phosphate has generally given the larger increases on unlimed ground, while the acid phosphate has generally given the larger increases on limed ground.—*George Roberts.*

464. ROBINSON, C. S. The determination of carbon dioxide in water-soluble carbonates. *Soil Sci.* 10: 41-47. *Fig. 1.* 1920.—A description is given of precautions used and modifications in the apparatus made in determining the carbon dioxide content of limestones, marls, and soils by Van Slyke's titrometric and gasometric methods.—*W. J. Robbins.*

465. SCHOLLENBERGER, C. H. Organic phosphorus content of Ohio soils. *Soil Sci.* 10: 127-141. *Fig. 1.* 1920.—The relation of the organic phosphorus content of twelve soils in relation to other soil constituents is reported. Virgin soil samples are richer in total phosphorus than cultivated soils of the same type, and the organic phosphorus contents stand in the same order as the contents of total phosphorus. From average data one-third of the phosphorus in the surface and one-fifth in the subsurface is organic. Organic phosphorus is probably not of a high order of availability.—*W. J. Robbins.*

466. THORNBEE, H. Cover crops, tillage and commercial fertilizers. *Better Fruit* 15²: 5, 20-22. Aug., 1920.

467. THORNE, CHARLES E. Carriers of nitrogen in fertilizers. *Soil Sci.* 9: 487-494. 1920.—Field experiments since 1894-5 with cereals and clover or potatoes and clover rotations fertilized with sodium nitrate, linseed meal, dried blood, ammonium sulfate, and tankage show in 40 comparisons with but 2 exceptions that sodium nitrate has produced the largest yield. The same is true of a tobacco-wheat-clover rotation except on limed land, where the yields from the ammonium sulphate slightly exceed those from sodium nitrate.—*W. J. Robbins.*

MOISTURE RELATIONS

468. CUNNINGHAM, BRYSSON. Rainfall and drainage. [Rev. of: CRASTER, J. E. E. Estimating river flow from rainfall records (*Engineering*. Jan. 2, 1920). *Nature* 105: 42. 1920.]—Craster finds the proportion of run-off to rainfall varies in both England and America from 33 to 67 per cent. That not less than 1 mm. (0.04 inch) of rainfall is required to wet vegetation and surface of ploughed land; this being lost by evaporation after every rain. Percolation may be estimated roughly at not less than 10 per cent. Mentions also data on transpiration.—*O. A. Stevens.*

469. GARDNER, WILLARD. A capillary transmission constant and methods of determining it experimentally. *Soil Sci.* 10: 103-126. *Fig. 1-8 B.* 1920.—A capillary-transmission-constant similar to the specific conductivity of metals and the specific thermal conductivity of heat conductors is defined, and methods for its measurement are described. Using this constant, a calculation is made which shows that in a certain soil 12 inches of water may be available from a 12 foot water-table in 30 days.—*W. J. Robbins.*

470. KARRAKER, P. E. The effect of the initial moisture in a soil on moisture movement. *Soil Sci.* 10: 143-152. 1920.—Soils were placed in vertical tubes with their lower ends in water, and the penetration of water was determined. The rate of water movement was about as great in air or oven dry soils as in soils containing up to about 6 per cent initial moisture. In saturated sand the movement was 1.56 times that in air-dry sand.—*W. J. Robbins.*

471. LIVINGSTON, BURTON E., AND RIICHIRO KOKETSU. The water-supplying power of the soil as related to the wilting of plants. *Soil Sci.* 9: 469-485. 1920.—See *Bot. Absts.* 7, Entry 399.

472. WOLKOFF, M. I. Effect of various soluble salts and lime on evaporation. Capillary rise and distribution of water in some agricultural soils. *Soil Sci.* 9: 409-436. *4 fig.* 1920.—Soluble salts added to soil materially decreased the evaporation of soil moisture. The efficiency of a salt in decreasing evaporation was shown to depend upon the osmotic concentration of salts in the surface inch of soil. The soils from which the least water evaporated showed the greatest osmotic concentration in the first inch. There was practically no diffusion of the salts downward against the rise of capillary water. In two agricultural soils used, sodium chloride decreased the capillary rise of water. Calcium oxide in drab clay and potassium phosphate in brown silt loam accelerated water rise. In these soils the addition of the salts increased the water content in the first 8 inches, as compared with untreated soil. The crust formed on the surface of the soil by some of the salts did not retard evaporation. With untreated soils, the texture of the soil influences the extent of evaporation. Soils having a greater amount of fine material show greater loss of water by evaporation.—*Dorothy Wilson.*

PEAT

473. ALWAY, F. J. Chemical requirements of peat soils in the light of European experience. *Jour. Amer. Peat Soc.* 13: 327-341. 1920.—European peat soils are placed in two classes, those with (1) low lime requirement, and (2) high lime requirement.—*G. B. Rigg.*

474. LEVIN, E. The use of peat as a fertilizer in Michigan. *Jour. Amer. Peat Soc.* 13: 319-327. 1920.—Fertilizer prepared by composting peat and manure gave good results on uplands.—*G. B. Rigg.*

475. PUCHNER, H. Hysteresis of aqueous solutions of peat soil. *Jour. Amer. Peat Soc.* 13: 351. 1920.—An aqueous extraction of peat soil contained gels of silicic acid, ferric hydroxide, and alumina. On ignition the extract yielded alumina, ferric oxide, manganese oxides, lime, magnesia, sulphate, phosphate, and silicate.—*G. B. Rigg.*

476. ROST, C. O. Pyrites and its toxic oxidation products in peat soils. *Jour. Amer. Peat Soc.* 13: 303-306. 1920.—Iron sulphide is widely distributed in peat soils. It appears mostly as pyrite, which is insoluble in water. In air it is oxidized to ferrous sulphate and sulphuric acid, both of which are soluble and toxic to plants.—*G. B. Rigg.*

MISCELLANEOUS

477. LINHART, G. A. A new and simplified method for the statistical interpretation of biometrical data. *Univ. California Publ. Agric. Sci.* 4: 159-181. *12 fig.* 1920.—See *Bot. Absts.* 7, Entry 396.

478. NIKLAS, H. *Die Bedeutung der Geologie für die land- und Forstwirtschaftliche Bodenkunde.* [The significance of the science of geology with relation to agricultural and forest soil science.] *Naturwiss. Zeitschr. Forst-u. Landw.* 18: 22-35. 1920.—After considering all cultural conditions of the soil in 434 agricultural precincts, NIKLAS divides the soils in seven classes, based on heavy, intermediate, and light soils, and variety of products produced. The prepared chart showed a marked coincidence with the geological charts, although these were not considered in preparing the soil chart. In so far as forestry is concerned, a soil study is still more imperative, because of the longer period of time in which mistakes must be realized. It will be necessary to make a study of the chemical and physical properties of the various soils of each geological formation, and to relate this study to one of the principal tree species. The employment of agriculturists and foresters in the various geological bureaus, whose duties would be to prepare the geological charts for practical use, is recommended.—*J. Roeser.*

479. NIKLAS, H. *Eine landwirtschaftliche Bodenübersichtskarte von Bayern.* [An agricultural soil survey chart for Bavaria.] *Naturwiss. Zeitschr. Forst-u. Landw.* 18: 62-65. 1920.—As a temporary guide for constructing a soil chart for Bavaria, for forestry and agriculture, the author has made use of the official cultivation statistics, which have been kept for the past 20 years. He contends that the knowledge of the soil gained through long years by agriculturists and foresters shows itself in the choice of cultural species growing on the ground. The author essentially repeats his observations of an earlier article. (See Bot. Absts. 7, Entry 478), appearing in the previous issue of this paper.—*J. Roeser.*

480. SCHUSTER, MATTHÄUS. *Wie soll der Land- und Forstwirt Geologische Karten lesen?* [How shall the agriculturist and forester read geological charts?] *Naturwiss. Zeitschr. Forst-u. Landw.* 18: 10-22. 1 fig. 1920.—The principal reason why agriculturists and foresters have not reconciled themselves to geological charts is that they cannot familiarize themselves with the manner of representation used. The modern charts often contain a mass of colors and symbols, which are apt to confuse the user. The Bavarian charts have been prepared to meet both the scientific and practical demand, and are easily legible without detailed explanations. The author gives a detailed description of the method of preparation and the methods of interpreting these charts; and by means of a short field trip over the terrain represented on a model chart, shows the relation existing between rock and soil and the cultural use of the soil, and also explains the methods employed by the geologist to show the relations.—*J. Roeser.*

TAXONOMY OF VASCULAR PLANTS

J. M. GREENMAN, *Editor*

E. B. PAYSON, *Assistant Editor*

GENERAL

481. ANONYMOUS. [Rev. of: BLATTER, ETHELBERG. *Flora Arabica.* Part 1. *Rec. Bot. Surv. India* 3, No. 1.] *Nature* 104: 609. 1920.—Includes list of thirty-eight families (BENTHAM and HOOKER arrangement) including vernacular names and uses, also discussion of botanical regions.—*O. A. Stevens.*

482. ANONYMOUS. [Rev. of: GAMBLE, J. S. *Flora of the Presidency of Madras.* Part 3. P. 391-577. *Leguminosae—Caesalpiniodeae to Caprifoliaceae.* Aldard and Son, and West Newman, Ltd.: London, 1919.] *Nature* 105: 36. 1920.

483. BENOIST, R. *Plantes récoltées par M. E. Wagner en République Argentine.* [Plants collected by M. E. Wagner in the Argentine.] *Bull. Mus. Hist. Nat.* [Paris] 25: 655-661. 1919.—Detailed notes concerning some 20 species collected in the province of Santiago include information as to habitat, economic importance, common name, etc.—*E. B. Payson.*

484. BLATTER, E., AND F. HALLBERG. The flora of the Indian desert, (Jodhpur and Jaesalmer). Jour. Bombay Nat. Hist. Soc. 26: 218-246; 525-551; 811-818. 39 pl. 1918-19.—A systematic enumeration with extensive notes and citation of specimens. The following new forms are described: *Farsetia macrantha*, *Cleome brachycarpa* Vahl var. *glauca*, *Gynandropsis pentaphylla* DC. var. *nana*, *Melhania magnifolia*, *Zizyphus truncata*, *Psoralea odorata*, *Tephrosia incana* Grah. var. *horizontalis*, *T. multiflora*, *T. petrosa*, *Rhynchosia rhombifolia*, *R. arenaria*, *Angoëssus rotundifolia*, *Trianthema pentandra* Linn. var. *rubra*, var. *flava*, *Pulicaria rajputanae*, *Glossocardia setosa*, *Convolvulus densiflorus*, *C. gracilis*, *Aerua pseudotomentosa*. The seventy-eight photographic illustrations of desert scenes and vegetation accompanying this paper are excellent.—E. D. Merrill.

485. BOLZON, P. Ricerche botaniche nel bacino della Dora Baltea. [Botanical researches in the basin of the Dora Baltea.] Nuovo Giorn. Bot. Ital. 25: 309-376. 1918.—The author presents a detailed enumeration of an extensive collection of plants recently made in the valley of the Dora Baltea in northern Italy.—J. M. Greenman.

486. BROWN, WILLIAM H., AND ELMER D. MERRILL. Philippine palms and palm products. Forestry Bur. Philippine Islands Bull. 18. 129 p., 44 pl. 1919.—See Bot. Absts. 6, Entry 533.

487. FARWELL, OLIVER A. Notes on the Michigan Flora, II. Michigan Acad. Sci. Ann. Rept. 21: 345-371. 1919.—Reference is made to several species whose range is known to cross Michigan and which should, therefore, be sought in the state. Among these may be mentioned: *Phegopteris Robertiana* (Hoffm.) A. Br., *Asplenium viride* Huds., *Calamagrostis hyperborea* Lange, *Woodsia glabella* R. Br. and *Calamagrostis Pickeringii* var. *lacustris* (Kearney) Hitch. The author claims that the application of the principles of priority in nomenclature produces the following changes: *Elodea canadensis* Mx. for *philotria canadensis* (Mx.) Britton, *Digitaria* Heist. for *Syntherisma* Walt., *Ginania* Bub. for *Holcus* Authors, *Reboullea* Kunth. for *Eatonia* Authors, *Trichoon* Roth. for *Phragmites* Trin., *Trichophyllum* Ehrh. for *Eleocharis* R. Br., *Iria castanea* (Mx.) n. comb. for *Fimbristylis castanea* (Michx.) Vahl., *Eriophorum* for *Scirpus* in part, and *Phaeocephalum* Ehrh. for *Rynchospora* Vahl. Changes in family names, in whole or part, are recommended as follows: *Scheuchzeriaceae* becomes *Juncaginaceae*, *Alismaceae* becomes *Alismoidaceae*, *Potamogetonaceae* becomes *Fluvialaceae*, *Valisneriaceae* becomes *Hydrocharidaceae*, *Gramineae* becomes *Graminaceae*, *Polygonaceae* becomes *Persicariaceae*, *Chenopodiaceae* becomes *Blitaceae*, *Leguminosae* becomes *Leguminaceae*, *Rhamnaceae* becomes *Ziziphaceae*, *Tiliaceae* becomes *Tiliataceae*, *Onagraceae* becomes *Corniculataceae*, *Umbelliferae* becomes *Umbellataceae*, *Fagaceae* becomes *Castanaceae*, *Scrophulariaceae* becomes *Ringentaceae*, and *Compositae* becomes *Compositaceae*.—H. T. Darlington.

488. HEMSLEY, W. BOTTING, AND OTHERS. Flora of Aldabra: with notes on the flora of neighboring islands. Bull. Misc. Inf. Kew 1919: 108-153. 1919.—A description of the Aldabra atoll in the Indian Ocean is followed by paragraphs concerning the climate, history of botanical investigation, and relation of its flora to that of some other small islands of the Western Indian Ocean. There is given a systematic enumeration of the vascular plants of Aldabra with the citation of exsiccatae.—E. B. Payson.

489. JEANPERT, ED. Énumération des plantes de Macédoine. [Enumeration of plants of Macedonia.] Bull. Mus. Hist. Nat. [Paris] 25: 662-668. 1919.—This series of papers listing the plants of Macedonia is here concluded.—E. B. Payson.

490. LECOMTE, HENRI. Sur les principaux caractères de structure des bois. [Concerning the principal characters of wood structure.] Bull. Mus. Hist. Nat. [Paris] 26: 166-171. 1920.—See Bot. Absts. 7, Entry 326.

491. MCATEE, W. L. Specific, subspecific, and varietal categories of insects and the naming of them. Entomol. News 31: 46-55, 61-65, 1920.—The author does not regard intergradation a sufficient reason for "lumping" closely related species which exhibit it. Men-

tions plant families Rubiaceae and Caprifoliaceae among examples of groups separated by no absolutely trenchant character. Considers recognition of geographical subspecies a useful feature even though they may intergrade completely where their ranges meet. Discusses also color phases and formation of names. Names should be chosen which are least liable to prove inappropriate, avoiding too free use of those derived from personal or geographical names.—O. A. Stevens.

492. MIYOSHI, MANABU. Über der Erhaltung einer neuen wildwachsenden hängenden Varietät des Kastanienbaumes als Naturdenkmal. [Concerning a new wild chestnut with weeping branches and its preservation as a natural monument.] Bot. Mag. Tôkyô 33: 185-188. 1 photo. 1919.—See Bot. Absts. 4, Entry 452.

493. ROCK, JOSEPH F. One government forest. Hawaiian Forester and Agric. 16: 39-40. 3 pl. February, 1919.—A description of Reserve lands at Kulani, Hawaii. The forest is mainly a tree-fern forest made up of the two common types *Cibotium Chamissoi* and *Cibotium Menziesii*. Apart from these, representatives of the genus *Metrosideros* are the most common. Dispersed through the region is also a beautiful native fan palm with large orbicular fruits described by the writer as a new species under the name of *Pritchardia Beccariana*.—Stanley Coulter.

494. SCHONLAND, S. Phanerogamic flora of the divisions of Uitenhage and Port Elizabeth. Mem. Bot. Surv. South Africa [Pretoria] 1: 1-118. 1919.—The present work consists of an annotated list of the flowering plants of the territorial divisions mentioned in the title. Valuable information is recorded on the topography, climate, rainfall, plant formations, etc. The total number of species listed is 2416, of which 2312 are indigenous and 104 are non-native species.—J. M. Greenman.

495. TURRILL, W. B. Contributions to the flora of Macedonia: II. Bull. Misc. Inf. Kew 1919: 105-108. 1919.—A list of species of flowering plants collected by J. M. RUSSELL in Central Greek Macedonia in 1918.—E. B. Payson.

496. TURRILL, W. B. Botanical results of Swedish South American and Antarctic expeditions. Bull. Misc. Inf. Kew 1919: 268-279. 1919.

PTERIDOPHYTES

497. BRAUSE, G. Bearbeitung der von C. Ledermann von der Sepik- (Kaiserin-Augusta-) Fluss-Expedition 1912 bis 1913 und von anderen Sammlern aus dem Papuagebiete früher mitgebrachten Pteridophyten, nebst Uebersicht über alle bis jetzt aus dem Papuagebiet bekannt gewordenen Arten derselben. [Revision of the Pteridophytes collected by Ledermann on the Sepik River Expedition, those brought out by earlier collectors in Papuasias, and a summary of all known species of this group from the Papuasian region.] Under the general heading: C. LAUTERBACH, Beiträge zur Flora von Papuasien VII, no. 62. Bot. Jahrb. 56: 30-250. 1920.—This is a very extended treatment of the Pteridophytes of Papuasias, with references and notes on distribution, structure, classification, and nomenclature. The following new varieties, species and combinations are proposed: *Trichomanes papuanum*, *T. concinnum* Mett. var. *emarginata*, *T. subtilissimum*, *T. Ledermanni*, *T. maluense*, *T. Englerianum*, *T. meifolium* Bory var. *linearis* and var. *contracta*, *Hymenophyllum Ledermanni* and var. *nutans*, *H. Herterianum*, *H. Rosenstockii*, *H. sabinifolium* Bak. var. *irregularis* and var. *imbricata*, *Dicksonia Ledermanni*, *D. Hieronymi*, *Cyathea Rosenstockii*, *C. procera*, *C. cincinnata*, *C. subspathulata*, *C. sepikensis*, *C. Ledermanni* and var. *dilatata*, *C. Hunsteiniana* and var. *acuminata*, *Hemitelia Ledermanni*, *Alsophila recurvata*, *A. marginata*, *A. Rosenstockii*, *A. Hunsteiniana*, *A. rubiginosa*, *A. Dielsii*, *A. gregaria*, *A. dryopteroides*, *A. tenuis*, *A. brunnea*, *A. olivacea*, *A. Ledermanni*, *A. scandens*, *Dryopteris Hunsteiniana*, *D. diaphana*, *D. calcarata* (Bl.) O. Ktze. var. *ciliata* (*Aspidium ciliatum* Wall.), *D. subnigra*, *D. coriacea* and var. *elata*, *D. ensipinna* and var. *acuminata*, *D. glaucescens*, *D. alta*, *D. pallescens*, *D.*

fulgens, *D. ledermanni*, *D. notabilis*, *D. Metteniana* Hieron. var. *novoguineensis*, *D. subdigitata*, *D. urophylla* (Wall.) C. Chr. var. *cuspidata* (*Meniscium cuspidatum* Bl.), *D. stellatopilosa*, *D. mutabilis*, *D. micans*, *D. dimorpha*, *D. sepikensis*, *D. hispida*, *D. transversaria* (*Nephrodium transversarium* Brack.), *D. mollis* (Jacq.) Hieron. var. *amboinensis* (*Aspidium amboinense* Willd.), *D. superba*, *D. muricata* and var. *marginata* and var. *obscura*, *D. austera*, *D. oblonga*, *D. farinosa*, *D. Ridleyana* (*Goniopteris rigida* Ridley), *D. hastato-pinnata*, *Aspidium Ledermanni*, *Leptochilus novoguineensis*, *Humata Ledermanni*, *Davallia Ledermanni*, *Lindsaya marginata* and var. *falcata*, *L. Rosenstockii*, *L. Boryana* (*Davallia Boryana* Pr.), *L. Ledermanni*, *L. sepikensis*, *L. obscura*, *Athyrium Ledermanni* Hieron., *Diplazium pseudoshepherdoides* Hieron., *D. Nymani* Hieron., *D. Naumanni* Hieron., *D. Schlechteri* Hieron., *D. Schultzei* Hieron., *D. Schraderi* Hieron., *D. scotinum* Ros. var. *contracta* Hieron., *Asplenium nidus* L. var. *ficiifolia* (*Aspl. ficifolium* Goldm.), *A. comosum* Christ var. *subcrispa* Hieron. and var. *furcata* Hieron., *A. Lauterbachii* Christ var. *elongata* Hieron., *A. acrocarpum* Hieron. (*Diplazium acrocarpum* Ros.), *A. caudatum* Forst. var. *Ledermanniana* Hieron., *A. Ledermanni*, Hieron. and var. *lobulata* Hieron., *Blechnum saxatile*, *B. Ledermanni*, *B. deorsolobatum*, *B. Hieronymi*, *D. decorum* and var. *dilatata*, *B. pendulum*, *B. papuanum*, *B. Fraseri* (A. Cun.) Luers. var. *novoguineensis*, *Coniogramme macrophylla* (Bl.) Hieron. var. *undulata* Hieron., *Hypolepis punctata* (Thbg.) Mett. var. *obscura*, *Vittaria rubens* Hieron., *V. Ledermanni* Hieron., *V. Nymani* Hieron., *V. semipellucida* Hieron., *V. latissima* Hieron., *V. exigua* Hieron., *Antrophyum Ledermanni* Hieron., *Drymoglossum Schlechteri* Hieron. & Brause, *Polypodium trichopodium* F. v. Muell. var. *serrato-lobatum*, *P. ornatissimum* Ros. var. *dichotomum*, *P. glanduloso-pilosum*, *P. sepikense*, *P. politum*, *P. eximium*, *P. flagelliforme*, *P. ctenoideum*, *P. celebicum*, Bl. var. *aurita*, var. *dichotomum*, *P. truncata-sagittatum*, *P. redimians*, *P. balteiforme*, *P. ochrophyllum*, *P. ferreum*, *P. cyathisorum*, *P. egregium*, *P. ingens*, *P. alloiosorum*, *P. polysorum*, *P. ulotheca*, *Cyclophorus Ledermanni*, *Dryostachyum novoguineense* Brause var. *lanceolata*, *Gleichenia dolosa* (Copel.) C. Chr. var. *virescens* Hieron., *G. linearis* (Burm.) Clarke var. *subferruginea* Hieron., *G. novoguineensis*, *Schizaea papuana*, *Angiopteris evanidostrata* Hieron., *A. Lauterbachii* Hieron., *A. Dahlii* Hieron., *A. undulato-striata* Hieron., *A. crinita* Christ var. *sepikensis* Hieron., *A. Hellwigii* Hieron., *Selaginella Ledermanni* Hieron., *S. Kerstingii* Hieron. var. *brevimucronata* Hieron., *S. Thurnwaldiana* Hieron., *S. Schatteburgiana* Hieron., *S. Bürgeriana* Hieron., *S. Behrmanniana* Hieron., *S. Roesickeana* Hieron., *S. Stolleana* Hieron., *S. gracilis* Moore var. *subbiflora* Hieron., *S. Bamleri* Hieron., *S. Schraderiana* Hieron., and *S. sepikensis* Hieron. Papuasias is one of the richest regions in the world in ferns. The geographical fern region of Papuasias extends to the neighboring islands in all directions, and the limits are given. A table is given of the number of species in each genus common to Papuasias and each of the surrounding groups of islands as well as countries more distant. *Trichomanes* is especially well developed. *Dryopteris* is also highly developed with 112 species. *Polypodium* is the largest genus with 168 species. *Aspidium* and *Polystichum* are poorly represented. The Pterideae are little developed. *Azolla*, *Marsilea*, *Salvinia*, and *Pilularia* have as yet not been found. *Botrychium* is not known, though *Ophioglossum* is moderately represented. *Selaginella* is represented by 58 species.—K. M. Wiegand.

498. BRAUSE, G. Über die von C. R. W. K. van Alderwerelt van Rosenburgh neu aufgestellte Gattung *Thysanobotrya*. [On van Alderwerelt van Rosenburgh's new genus *Thysanobotrya*.] *Hedwigia* 61: 401. 1920.—GEPP described a new fern from Dutch New Guinea as *Polybotrya arfakensis*. VAN ROSENBURGH separated this under a new generic name as *Thysanobotrya arfakensis* (Gepp) v.A.v.R. The present author finds that the original description and figures correspond to *Alsophila biformis* Ros. He considers *Alsophila* the proper genus for this plant and sees no reason for the creation of a separate genus *Thysanobotrya*.—K. M. Wiegand.

499. HIERONYMUS, G. Über *Cheilanthesis* Hieron., eine neue Farngattung. [*Cheilanthesis*, a new genus of ferns.] *Notizbl. Bot. Gart. Berlin* 7: 406–409. 1920.—The genus differs from *Cheilanthes* in its dorsiventral spores; from *Hypolepis*, to which it is closely related in its ascending rhizome and fascicled leaves. Although based on *Cheilanthes straminea* Brause, no transfer of that species to the new genus is made.—H. A. Gleason.

500. HOLM, THEO. Internal glandular hairs in Dryopteris. *Rhodora* 22: 89-90. 2 fig. 1920.—See Bot. Absts. 6, Entry 1183.

501. HOUSE, HOMER D. The Genus *Aetopteron*, Ehrhart. *Amer. Fern Jour.* 10: 88-89. 1920.—The author revives the name of *Aetopteron* of EHRHART to replace *Polystichum* and makes the following new combinations: *Aetopteron aculeatum* (*Polystichum aculeatum* L.), *A. acrostichoides* (*Nephrodium acrostichoides* Michx.), *A. Braunii* (*Aspidium Braunii* Spenner), *A. Lemmoni* (*Polystichum Lemmoni* Underw.), *A. lonchites* (*Polypodium lonchites* L.), *A. munitum* (*Aspidium munitum* Kaulf.), *A. scopulinum* (*Ascidium aculeatum* var. *scopulinum* D. C. Eaton).—F. C. Anderson.

502. WEATHERBY, C. A. Varieties of *Pityrogramma triangularis*. *Rhodora* 22: 113-120. 1920.—The author recognizes three geographic varieties in addition to the typical *P. triangularis*. The separation is based on the presence or absence of glands on the lamina and stipe, and on the character of these glands when present. A key to the varieties and the bibliography of each is given.—James P. Poole.

SPERMATOPHYTES

503. ANONYMOUS. *Decades Kewenses. Decades XCII & XCIII.* Bull. Misc. Inf. Kew 1919: 221-231. 1919.—The following species are described as new: *Aconitum funiculare* Stapf, *Indigofera Barberi* Gamble, *Erythrina mysorensis* Gamble, *Smithia Venkobarrowii* Gamble, *Desmodium wynaadense* Bedd., *Vigna Bourneae* Gamble, *Rosa Saundersiae* Rolfe, *Bruguiera Hainesii* C. G. Rogers, *Sonerila pulneyensis* Gamble, *Memecylon flavescens* Gamble, *M. Lawsonii* Gamble, *M. Lushingtonii* Gamble, *M. madgolense* Gamble, *M. sisparensense* Gamble, *Pimpinella pulneyensis* Gamble, *Schefflera Bourdillonii* Gamble, *S. bengalensis* Gamble, *Linociera Parkinsonii* Hutchinson, *Sarcococca vagans* Stapf, *Chrysopogon setifolius* Stapf.—E. Mead Wilcox.

504. ANONYMOUS. *Decades Kewenses. Decas XCIV.* Bull. Misc. Inf. Kew 1919: 403-407. 1919.—The following species are described as new: *Calathodes oxycarpa* Sprague, *Osbeckia travancorica* Bedd., *Oldenlandia Bourdillonii* Gamble, *O. eualata* Gamble, *O. Ramarowii* Gamble, *O. villosostipulata* Gamble, *O. wynaadensis* Gamble, *Ophiorrhiza Barberi* Gamble, *O. codyensis*, *O. pykarensis* Gamble.—E. Mead Wilcox.

505. ANONYMOUS. *Diagnoses Africanæ: LXXII.* Bull. Misc. Inf. Kew 1919: 263-267. 1919.—The following species are described as new: *Kalanchoe densiflora* Rolfe, *Anisophyllaea tomentosa* Rolfe, *Scyphosyce pandurata* Hutchinson, *Kniphofia Snowdeni* C. H. Wright, *Eriocaulon recurvifolium* C. H. Wright, *Brachiaria nana* Stapf, *Panicum uvulatum* Stapf, *P. epacridifolium* Stapf, *P. bambusiusculum* Stapf, *Rutenbergia Usagarae* H. N. Dixon.—E. Mead Wilcox.

506. BLATTER, E., AND F. HALLBERG. A revision of the Indian species of *Rotala* and *Ammannia*. Part II. *Jour. Bombay Nat. Hist. Soc.* 26: 210-217. 1918.—Completed from the preceding volume, the second part covering six species of *Ammannia*; no new names appear.—E. D. Merrill.

507. BRIQUET, J. *Decades plantarum novarum vel minus cognitarum.* [Decades of new or little-known plants.] *Annuaire Conservatoire et Jard. Bot. Genève* 20: 342-427. 1919.—This is the twenty-sixth of a series and includes the families from Celastraceae to Valerianaceae. The new names are: *Maytenus pilcomayensis* (Paraguay, Rojas 401), *M. Hassleri* (Paraguay, Hassler, 1342), *M. Mathewsii* (Peru, Mathews), *M. Pavonii* (Peru, Pavon 53), *M. evonymoides* var. *Minarum* (Brazil, Glaziou 12538, 13665) and var. *pycnodonta* (Paraguay, Hassler, 7358), *M. retusa* (*Celastrus retusus* Poir.), *M. durifolia* (Peru, Pavon 564), *M. Jamesonii* (Ecuador, Jameson 222), *M. vexata* (*M. myrsinoides* Urb. not Reissek), *M. Trianae* (*M. buxifolius* Tr. & Pl. not Griesb.), *M. Schottii* (*M. repanda* Reiss. not Turcz.), *M. Lorentzii*

(Argentina, Lorentz 1198), *M. paraguariensis* (Paraguay) var. *genuina* (Hassler 2564) and var. *grandifolia* (Rojas 508), *M. Fendleri* (Venezuela, Fendler 215), *M. ebenifolia* var. *Poeppigii* Brazil, Poeppig 3008) and var. *Ulei* (Brazil, Ule 6084), *M. macrocarpa* (*M. multiflora* Loesen., not Reissek), *M. longipes* (Colombia, Smith 454), *M. laurina* (Brazil, Spruce 2284), *M. Sprucei* (Brazil, Spruce 3970), *M. tarapotensis* (Peru, Spruce 4329), *M. controversa* (Brazil, Glaziou 13666), *M. Blanchetii* (Brazil, Blanchet 3780), *Columellia Mathewsii* (Peru, Mathews), *Clethera Broadwayana* (Trinidad, Broadway 2594), *C. Schlechtendalii* (Mexico, Schiede & Deppe), *C. Galeottiana* (Mexico, Galeotti 1820), *C. confusa* (Mexico, Pringle 2425). *C. guadalajarensis* (Mexico, Pringle 2502), *C. Smithii* (Columbia, Smith 2422), *C. angustinensis* (Venezuela, Funk 163), *Callisthene durifolia* (Brazil, Claussen), *C. Clausseniana* (Brazil, Claussen), *C. robusta* Briq. & Glaz. (Brazil, Glaziou 20679), *C. Glazioui* (Brazil, Glaziou 20681), *C. mucronata* (Brazil, Glaziou 20680), *C. Hassleri* (Paraguay, Hassler 10638), *Qualea obtusata* (Brazil, Spruce 3341), *Vochisia alternifolia* Briq. & Galz. (Brazil, Sello), *Vochisia Haenkeana* var. *genuina* (Peru, Haenke), var. *Sprucei* (Spruce 4078) and var. *microphylla* (Mathews 1650), *V. grandis* var. *Douvillei* (Brazil, Douville), *V. stenophylla* (Brazil, Glaziou 13807), *Hypericum connatum* var. *obscurum* (Brazil, Czermak. & Reineck 590), var. *paraguariense* (Bolivia, Fiebrig. 2361) and var. *Fiebrigii* (Bolivia, Fiebrig 2361 p. p.), *H. cordiforme* var. *genuinum* (Brazil, Guillemain 315), var. *Hilairei* (var. β St. Hil.) and var. *Glazioui* (Brazil, Glaziou 14534), *H. Stolzii* (Nyassa, Stolz 2223), *Hydrangea Schlimii* (Columbia, Schlim 1139), *H. platyphylla* (Colombia, Linden 894), *H. Trianae* (Columbia, Triana), *H. Goudotii* (Colombia, Goudot), *H. durifolia* (Colombia, Funck & Schlim 1393), *H. Oerstedii* (*H. peruviana* Hemsl. not Moric.) *H. Preslii* (*Sarcostyles peruviana* Presl not *H. peruviana* Moric.), *H. ecuadorensis* (Ecuador, Spruce 5058), *H. umbellata* (*Cornidia umbellata* Ruiz. & Pav.), *H. Sprucei* (Colombia, Spruce 4328), *H. mathewsii* (Peru, Mathews), *H. tarapotensis* (Peru, Spruce 4349), *Escallonia illinita* var. *pubicalicina* (Argentina, Bâcle), var. *angustifrons* (Chile, Bertero 984), var. *eu-illinita* (*E. illinita* Presl), *E. pycnantha* (Chile, Bridges), *E. modesta* (Chile, Bridges), *Ilex Merrillii* (Philippines, Merrill 881), *Eucryphia lucida* (*Carpodontos lucida* Labill.), *Sollya fusiformis* (*Billardiera fusiformis* Labill.), *Turpinia heterophylla* (*Staphylea heterophylla* Ruiz. & Pav.), *Sorindeia Goudotii* (Madagascar, Goudot), *Valeriana Bornmuelleri* (Brazil, Bornmüller 198). A correction to page 80 is, *Loeflingia Vaucheri* Briq. is *L. micrantha* var. *Vaucheri* Briq.—A. S. Hitchcock.

508. CAMUS, AIMÉE. Espèces et variétés nouvelles de Graminées de l'Asie Orientale. [New species and varieties of Gramineae from eastern Asia.] Bull. Mus. Hist. Nat. [Paris] 25: 669-672. 1919.—The following varieties, subspecies, and species are described as new: *Pollinia phaeotrix* Hack. var. *genuina*, *Pollinia phaeotrix* Hack. var. *aurea*, *P. phaeotrix* Hack. var. *tonkinensis*, *Miscanthus nudipes* Hack. subsp. *yunnanensis*, *M. japonicus* Anders. var. *formosanus*, *Cymbopogon Martini* Stapf var. *annamensis*, *Themeda arguens* Hack. var. *cochinchinensis*, *T. ciliata* Hack. var. *breviaristata*, *Isachne Eberhardtii*, *Panicum sarmentosum* Roxb. var. *mekongense*, *Leptochloa filiformis* R. & S. var. *subuniflora* G. & A. Camus, *Dendrocalamus sericeus* Munro var. *latifolius* G. & A. Camus, and *Arundinaria ciliata*.—E. B. Payson.

509. CAMUS, AIMÉE. Note sur le *Vetiveria zizanioides* Stapf (Graminées). [Note on *Vetiveria zizanioides* Stapf (Gramineae).] Bull. Mus. Hist. Nat. [Paris] 25: 673-674. 1919.—A key is given to the four recognized varieties of *Vetiveria zizanioides* with notes on distribution and citation of specimens. *V. zizanioides* Stapf var. *tonkinensis* is described as new to science.—E. B. Payson.

510. CORBISHLEY, A. G. *Nectaropetalum zuluense*. Bull. Misc. Inf. Kew 1919: 449-450. 10 fig. 1919.—The plant previously known as *Erythroxylon zuluense* Schönl. is found to be a true species of *Nectaropetalum*, and so becomes *N. zuluense* (Schönl.) Corbishley.—E. Mead Wilcox.

511. COULTER, J. M. Cactaceae. [Rev. of: BRITTON, N. L., AND J. N. ROSE. The Cactaceae. Carnegie Inst. Washington Publ. 248. 236 p., 36 pl., 302 fig. 1919.—(See Bot. Absts. 3, Entry 1824:)] Bot. Gaz. 68: 391. 1919.

512. DAVIDSON, ANSTRUTHER. [Without title.] Bull. Southern California Acad. Sci. 19: 10-12. 1920.—*Linanthus saxiphilus*, *Draba saxosa* and *Hutchinsia californica* are described as new. There are also notes on certain species of *Lupinus* and *Linanthus*.—*Roxana Stinchfield Ferris*.

513. EBERHARDT, PH. Sur une variété indochinoise du *Quisqualis indica* (Combrétacées). [On an Indo-Chinese variety of *Quisqualis indica* (Combretaceae).] Bull. Mus. Hist. Nat. [Paris] 25: 675-676. 1919.—A variety, *Quisqualis indica* L. var. *annamensis*, is described as new to science.—*E. B. Payson*.

514. EHINGER, M. *Odontoglossum Rossii* Lindl. Orchis 13: 33-35. 1919.—Notes on this species and some of its varieties are given with an illustration of the species.—*E. B. Payson*.

515. ENGLER, A. *Sterculiaceae africanæ*. VI. [Sterculiaceae of Africa. VI.] Bot. Jahrb. 55: 350-380. 1919.—A contribution under the general heading "Beiträge zur Flora von Afrika. XLVII. herausgegeben von A. Engler," continued from Bot. Jahrb. 45: 339. Three genera, *Melhania*, *Hermannia*, and *Cola* are treated, the main portion of the paper being an extended elaboration of the genus *Hermannia*. Since K. SCHUMANN's monograph of the African Sterculiaceae in 1900 the explorations in the Transvaal and other portions of South Africa have contributed a vast amount of material. Especially rich in this genus have been the collections of DINTER in Dutch-Southwest-Africa, RANGE and SCHAFER in Namaqualand, and SCHLECHTER in the Transvaal and Namaqualand. In 1907 ENGLER described eleven species. In the present paper, begun in 1918, about forty species are described as new, three of which are proposed by DIELS and four by SCHLECHTER. ENGLER has retained most of SCHUMANN's subgenera as sections but SCHUMANN's subdivision of *Euhermannia* he could not retain; rather HARVEY's groups in this subdivision were found to be more natural though they are here increased to seven. The section *Acicarpus* has been much elaborated beyond the treatment of HARVEY. The systematic subdivisions of *Hermannia* have natural geographic ranges. ENGLER's sections are as follows: (1) *Mahrenia*, north and east Africa, (2) *Euhermannia*, center of development southwestern Cape Colony, (3) *Scaphiostemon*, Damaraland, (4) *Acicarpus*, Abyssinia to the Transvaal and Namaqualand, and (5) *Mahernia*, mainly South Africa. The general distribution of the genus shows it to be very old and long established in its present range. That it dates back to a time when the continents probably had a different configuration than at present is indicated by the occurrence of one endemic species in South Australia and three in Texas and Mexico. Fifty-five species of *Hermannia* are treated in the paper. The following species, varieties, and combinations are new: Section *Mahrenia*; *H. Uhligii* Engl. Massai Steppes. Section *Euhermannia*; *H. glabripetala* Engl, Little Namaqualand; *H. cinerascens* Engl, Little Namaqualand; *H. Juttae* Dinter & Engl., Great Namaqualand; *H. melissifolia* Engl., S. W. Africa; *H. prismatocarpoides* Engl., East Cape Colony; *H. patellicalyx* Engl., Great Namaqualand; *H. arida* Diels, Southwest Cape Colony; *H. membraniflora* Schltr., Southwest Cape Colony; *H. myrioclada* Diels, Southwest Cape Colony; *H. subsquamulata* Engl., Southwest Cape Colony; *H. Bachmannii* Engl., Southwest Cape Colony; *H. minutiflora* Engl., Little Namaqualand to Damaraland; *H. macra* Schltr., Little Namaqualand; *H. longiramosa* Engl., North Hereroland. Section *Scaphiostemon*; *H. tenuipes* Engl., southwest Africa. Section *Acicarpus*; *H. longicornuta* Engl., Great Namaqualand; *H. spinulosa* Engl., Great Namaqualand; *H. deserticola* Engl., Great Namaqualand; *H. intricata* Engl., Great Namaqualand; *H. aspericaulis* Dint. & Engl., Little Namaqualand; *H. modestus* (Ehrenb.) Planch. var. *elatior* K. Schum. subvar. *virgatissima* Engl., Damaraland; subvar. *brevicornis* Engl., Transvaal; subvar. *macropetala* Engl., Transvaal, Damaraland and Hereroland; subvar. *mediipetala* Engl., Damaraland; var. *tsumebensis* Engl., Hereroland; *H. Stuhlmannii* Engl., East Africa; *H. pseudo-Mildbraedii* Dint. & Engl., Damaraland; *H. sideritifolia* Engl., Transvaal; *H. Seitziana* Engl., Great Namaqualand; *H. glandulosissima* Engl., Damaraland; *H. teilensis* Engl., Kilimanjaro; *H. tomentosus* (Turcz.) Schinz Msc. var. *brevifolia* Engl., Damaraland; *H. Seineri* Engl., north Hereroland, and var. *latifolia* Engl. Section *Mahernia*; *H. sparsipilosa* Engl., Transvaal; *H. pulchella* L. var. *picta* n. comb., Great Namaqualand; *H. bicolor* Dint.

& Engl., Damaraland; *H. Wilsnii* Engl., Natal; *H. hantamensis* Engl., Little Namaqualand; *H. coccocarpoides* Engl., Transvaal; *H. collina* Schltr., Little Namaqualand; *H. Meyeri* Engl., Little Namaqualand; *H. leucantha* Schltr., Little Namaqualand; *H. Vetteri* Engl., North Hereroland; *H. linnaeopsis* Dint. & Engel., Damaraland; *H. chloroleuca* Diels, northwest Cape Colony; *H. Medleyi* Engl., Natal; *H. Dieterlenii* Engl., Highland of southeast Africa; *H. Thodei* Engl., Highland of southeast Africa. Besides the new species and varieties of *Hermannia*, there are a few others as follows: *Melhania Dinteri* Engl., North Hereroland; *M. ferrugineoides* Engl., North Hereroland; *Cola subglauescens* Engl., South Kamerun; *C. edensis* Engl. & Krause, South Kamerun; and *C. Tessmannii* Engl. & Krause., forest province of Guinea.—*K. M. Wiegand.*

516. ENGLER, A. *Guttiferae africanae. III.* [Guttiferae of Africa. III.] Bot. Jahrb. 55: 381-396. 1919.—A contribution under the general heading "Beiträge zur Flora von Afrika. XLVII, herausgegeben von A. Engler," continued from Bot. Jahrb. 45: 339. The tropical African genus *Psorospermum* Spach is greatly in need of revision. In Oliver's "Flora of Tropical Africa" only four species were described. Besides these, SCHWEINFURTH described one, and ENGLER three, and C. H. WRIGHT one. In the present paper thirteen new species and two new varieties are proposed as follows: *P. Baumannii*, Togo, and var. *Afzelianum*, Sierra Leone; *P. Baumii*, Kunene-Kubango-Land; *P. awrantiacum*, Kamerun; *P. Staudtii*, Kamerun; *P. parviflorum*, Kamerun; *P. Kerstingii*, Togo; *P. laxiflorum*, Togo; *P. densipunctatum*, Kamerun; *P. Mechowii*, Angola; *P. adamauense*, Soudan Park-steppe Province; *P. Ledermannii*, Soudan Park-steppe Province, and var. *Doeringii*, Togo; *P. glaucum*, Soudan Park-steppe Province; *P. suffruticosum*, Soudan Park-steppe Province. Other new species described are as follows: *Haronga scandens*, Kamerun; *Garcinia Livingstonii* T. And. var. *pallidinervia*, Kondeland; *G. Stolzii*, north Nyassaland; *G. ubangensis*, Soudan Park-steppe Prov.; *G. Chevalieri*, French Guinea; *G. viridiflava*, Kamerun; *G. beniensis*, Lower Prov. of Cent. Africa; *G. mbulwe*, North Nyssaland; *G. arbuscula*, Kamerun; *G. quadrangula*, Kamerun; *G. tibatensis*, Soudan Park-steppe Prov.; *G. tenuipes*, Kamerun; *G. tschapensis*, Soudan Park-steppe Prov.; *G. Danckelmanniana*, Soudan Park-Steppe Prov.; *G. ndongensis*, Kamerun; *G. nitidula*, Kamerun; *G. Buchneri*, Angola; *Pentadesma Kerstingii*, Soudan Park-steppe Province, and Guinea forest Province.—*K. M. Wiegand.*

517. ENGLER, A. *Violaceae africanae. IV.* Zur Kenntnis der afrikanischen Hybanthus-Arten. [Violaceae of Africa. IV. Toward a knowledge of the African species of Hybanthus.] Bot. Jahrb. 55: 397-400. 1919.—A contribution under the general heading "Beiträge zur Flora von Afrika, XLVII." A key to the African species is given, and nine species are listed. The new species, combinations, and varieties are: *H. enneaspermus* (L.) F. v. Muell. var. *serratus*, Transvaal; *H. densifolius*, southwest Africa; *H. Hildebrandtii*, North Somaliland; *H. hirtus* (*Jonidium hirtum* Klotzsch); *H. hirtus* var. *Klotzschii*, Mozambique, Zanzibar; *H. hirtus* var. *glabrescens*, Somaliland, Zanzibar, Mozambique, Katanga; *H. Fritzscheanus*, Huilla; *H. caffer* (*Jonidium cafferum* Sond.); *H. caffer* var. *angustifolius*; *H. nyassensis* (*Jonidium nyassense* Engl.); *H. capensis* (*Jonidium capense* Roem. & Schult.); *H. thymifolius* (*Jonidium thymifolium* Presl).—*K. M. Wiegand.*

518. FUCHS, ALFRED. *Orchis Traunsteineri* Saut. Erster Teil. Ber. Naturw. Vereins Schwaben u. Neuburg 42: 3-174. 47 fig. 1919.—The author gives a full account of *Orchis Traunsteineri*, a member of the *Dactylorchis* group occurring in Central Europe. He divides this species, as ordinarily understood, into two species, the true *O. Traunsteineri* of Sauter and *O. pseudo-Traunsteineri*, which he describes as new. Under the second species he distinguishes and describes in detail the following new subspecies: *bavaricus*, *suevicus*, *gabretanus*, *gennachiensis*, *Hoepfneri*, *eifliacus* and *Koningweenianus*. To these subspecies he ascribes a hybrid origin, regarding them as more or less complex crosses between *O. Traunsteineri* and certain other members of the *Dactylorchis* group, such as *O. incarnatus* L. and *O. latifolius* L. The subspecies *suevicus*, for example, he expresses by the formula, (*Orchis incarnatus* + *latifolius*) + *Orchis Traunsteineri*; some of his other formulas are even more complicated. In the course of his discussions he describes the following new races: *O. incar-*

natus race *traunsteinerifolius* and *O. maculatus* race *falcatus*. The illustrations depict details of floral structure and especially variations in the form and lobing of the lip. In connection with the various plants described the author calls attention to the distinctive features of their habitats and lists the species, both bryophytes and spermatophytes, which are associated with them.—A. W. Evans.

519. GUILLAUMIN, A. Contribution à la Flore de la Nouvelle-Calédonie. [Contribution to the Flora of New Caledonia.] Bull. Mus. Hist. Nat. [Paris] 25: 645-652. 1919.—Species are listed with the citation of specimens made by various collectors. *Tapeinosperma Pennelii* is described as a species new to science.—E. B. Payson.

520. HAINES, H. H. Indian species of *Carissa*. Indian Forester 45: 375-388. Pl. 17-20, 7 fig. 1919.—Five species of *Carissa* are known in India, and a botanical description is given of each, with a key for their identification.—E. N. Munns.

521. HALL, CUTHBERT. On a new species or form of *Eucalyptus*. Proc. Linnean Soc. New South Wales 43: 747-749. Pl. 75. 1918.—*Eucalyptus Marsdeni*, forma vel sp. nov. is described in regard to its seedling, juvenile, and mature leaves; inflorescence; fruit; bark (unusual for a *Eucalypt*, to be classed with the stringy-barks, yet laminated with a sort of ochreous deposit on the outer surface of each layer, branch bark smooth and greyish, a half bark); timber, which is light brown, straight grained, has few gum-veins and works well, resembling *E. viminalis* in physical characters. The only known tree has been cut. The oil from leaves and terminal branches is thick and viscous, and its characteristics are discussed in detail.—Eloise Gerry.

522. HANSEN, W. Die Bestimmungen der echten Gräser nach äusseren Merkmalen. [The determination of the true grasses according to their external characters.] Illustrierte Landw. Zeitg. 39: 266. 1919.—For the identification of the grasses the writer presents a plan based primarily on the form of the inflorescence.—John W. Roberts.

523. HASSLER, E. Bromeliacearum paraguariensium conspectus. [A conspectus of the Bromeliaceae of Paraguay.] Annuaire Conservatoire et Jard. Bot. Genève 20: 268-341. 2 fig. 1919.—There is a short introduction, a technical description of the genera and species, and an index. Full notes with synonymy and bibliography are given. The genera are *Bromelia*, *Acanthostachys*, *Ananas*, *Aechmea*, *Billbergia*, *Deuterocohnia*, *Dyckia*, *Vriesea*, *Tillandsia*. The new names are: *Aechmea polystachia* var. *myriophylla* (A. *myriophylla* Morr.), A. (subg. *Platyaechna*) *platyphylla* (Santo Thomas, Sierra de Amambay, Hassler 11283 leg. Rojas), *A. ampullacea* var. *typica* (Yaguarazapá, Fiebrig 5431) and var. *longifolia* (Yhú, Hassler 9691), *Billbergia magnifica* var. *acutisepala* (Esperanza, Hassler 10726), *Deuterocohnia paraguariensis* (Cerro Margarita, Hassler 11098), *Dyckia ferox* f. *australis* (D. *ferox* Mez), f. *vulgaris* (Cerro-hú, Hassler 1447 et al), subsp. *hamosa* (D. *hamosa* Mez), *D. commixta* (Tobaty, Chod. & Vischer 97), *D. microcalyx* var. *inermis* (Villa Rica, Hassler 8787), var. *micrantha* (Alto Paraná, Fiebrig 5941), *D. distachya* (Fiebrig 5648), f. *induta* (Fiebrig 5824), *D. tobatensis* (Tobaty, Hassler 2099), *D. Hassleri* f. *gracilis* (Hassler 1120), var. *arenosa* (Cerro Corá, Hassler 10500), var. *subinermis* (Hassler 10500a), subsp. *basispina* (Esperanza, Hassler 10884), var. *montana* (Cerro Corá, Hassler 9789), *D. vestita* (Centurion, Fiebrig 5311), *D. Nissionum* var. *breviflora* (San Ignacio, Hassler 142), *D. insignis* (Centurion, Fiebrig 4615), var. *macrantha* (Centurion, Fiebrig 5310a), var. *obtusiflora* (Centurion, Fiebrig 5310), *Vriesea glutinosa* var. *viridis* (Santo Tomas, Hassler 3768), *Tillandsia stricta* var. *paraguariensis* (Hassler 3286 p.p.), *T. streptocarpa* var. *filifolia* (Balansa 615), *T. decomposita* var. *minor* (Hassler 3683), *T. confusa* (Lake Ypacaray, Hassler 3101), var. *saxatilis* (Hassler 3416), *T. arhiza* var. *rupestris* (T. *rupestris* Mez), *T. bandensis* var. *intermedia* (Santa Elisa, Hassler 2778), *T. tricholepis* var. *argentea* (Hassler 8517).—A. S. Hitchcock.

524. HOWARTH, W. O. *Festuca rubra* near Cardiff: a taxonomic morphological, and anatomical study of three sub-varieties of *Festuca rubra* L., subsp. *eu-rubra* Hack., var. *genuina* Hack., growing near Cardiff, S. Wales. New Phytol. 18: 263-286. 14 fig. 1919.—A detailed

study of the subvarieties *grandiflora* (Hack.), *tenuifolia* (new), and a third probably corresponding to HACKEL's *glaucescens*. The new subvariety is xerophytic and generally associated with halophytic conditions; fairly densely caespitose; rhizomes short and more or less curved and ascending from the base; leaves slender and dark glaucous green, with a "bloom;" panicle more compact than in *grandiflora*; internodes rough; spikelets fewer, but the individual glumes large and as numerous as in *grandiflora*, with shorter awns.—*I. F. Lewis*.

525. JÖRGENSEN, E. *Ajuga pyramidalis* × *reptans*. Bergens Mus. Aarb. (Naturh. Raekke) 1917-1918. 4 p. 1918.—At Nygaard Park in Bergen, specimens of *Ajuga reptans*, rare in Norway, were found with the common *A. pyramidalis*. Their hybrid was also found. The species and hybrid are described.—*A. Gundersen*.

526. JÖRGENSEN, E. Die Euphrasia-Arten Norwegens. [Euphrasia species of Norway.] Bergens Mus. Aarb. (Naturh. Raekke) 1916-1917: 5-337. 11 maps, 14 tables, 64 fig., bibliography. 1919.—Detailed discussion of characters and distribution of Norwegian species. These differ in degree, not in definite characters, representing an almost inextricable jumble answering the Mendelian splitting up of hybrids. Numerous new forms are described; one new species, *E. hyperborea*. In the usual sense of species there are only two, *E. salisburgensis*, and all other forms taken together. Summary given in English.—*A. Gundersen*.

527. KOIDZUMI, GENITI. Contributiones ad Floram Asiae Orientalis. [Contributions to the flora of eastern Asia.] Bot. Mag. Tôkyô 33: 217-223. 1919.—The author describes as new, *Lactuca grandicolla*, *Senecio muninensis*, *Pyrus Yoshinoi*, *Salix paludicola*, *S. Hidewoi*, *S. tsukoshiana*, *Cirsium Yoshizawae*, *Campanula microdonta*, with notes on other Japanese plants, and gives as a new combination, *Zanthoxylon inerme* (Rehd. & Wils.) Koidz.—*Roxana Stinchfield Ferris*.

528. LÁZARO E IBIZA, B. Revisión crítica de las especies peninsulares del género *Viola*. [A critical revision of the peninsular species of the genus *Viola*.] Revista R. Acad. Cien. Exactas, Fisicas y Nat. [Madrid] 17: 249-280, 391-421. 5 pl. 1919.—The species are divided into 3 groups and 8 sections. The following new species and varieties are described: *Viola longifolia*, *V. palustris* var. *genuina*, *V. odorata* var. *genuina*, *V. hirta* var. *genuina*, *V. biflora* var. *uniflora*, *V. canina* var. *genuina*, *V. sylvestris* var. *genuina*, *V. rupestris* var. *genuina*, *V. cornuta* var. *genuina*, *V. lactea* var. *genuina*, *V. parvula* var. *genuina*, and *V. lutea* var. *genuina*.—*L. L. Harter*.

529. MIETHE, E. *Cattleya superba* Schomb. Orchis 13: 10-12. 1919.—This species is here redescribed and illustrated.—*E. B. Payson*.

530. PELLEGRIN, FRANÇOIS. Note sur le Banda rouge et sur un Ombéga du Gabon. [Concerning the red Banda and an Ombéga of Gabon.] Bull. Mus. Hist. Nat. [Paris] 25: 653-654. 1919.—*Sindora Klaineana* Pierre is described as new to science. It is known locally as the red Banda. Ombéga is the vernacular term applied to *Entandrophragma rufa* Chevalier.—*E. B. Payson*.

531. PONZO, ANTONIO. Sul genere *Acacia*. [The genus *Acacia*.] Nuovo Gior. Bot. Ital. 25: 271-307. 1918.—A historical review of the position and limitation of the genus, a critical consideration of the essential and secondary taxonomic characters, and a regrouping and description of the species. The following subdivisions are recognized: (1) *Phyllodinae* with 29 species, (2) *Botryocephalae* with 4 species, (3) *Pulchellae* with one species, and (4) *Gumiferae* with 10 species.—*Ernst Artschwager*.

532. PRAIN, D., AND I. H. BURKILL. "*Dioscorea sativa*." Bull. Misc. Inf. Kew 1919: 339-375. 1919.—After an exhaustive enquiry into the aggregate that LINNAEUS included under the name *Dioscorea sativa*, it is shown that that name is one which can not be used.—*E. Mead Wilcox*.

533. R., J. K. [Rev. of: *Standard Cyclopaedia of Horticulture*. Vol. VI. S-Z with Supplement p. 3043-3639, fig. 3516-4056. Edited by L. H. Bailey. 1917.] *Jour. Botany* 57: 198-200. 1919.

534. SCHELLENBERG, G. *Connaraceae africanae*. III. [Connaraceae of Africa. III.] *Bot. Jahrb.* 55: 436-456. 1919.—The paper is made up of the descriptions of new species, and the designation of new combinations found necessary in the preparation of a monograph of the family soon to appear in "Das Pflanzenreich." The new species are: *Cnestis liberica*, Liberia; *C. Dinklagei*, Liberia; *C. cinnabarina*, Kamerun; *C. longiflora*, Lagos; *C. leucantha* Gilg, Kamerun; *C. calantha*, Kamerun; *C. gabunensis*, Gabun; *C. Zenkeri*, Kamerun; *C. macrophylla* Gilg, Kamerun; *Manotes Tessmannii*, Gagun; *M. Zenkeri* Gilg, Nigeria, Kamerun, etc.; *M. rosea*, Gabun and Kamerun; *M. rubiginosa*, Angola; *M. Soyauxii*, Loango; *Paxia calophylla* Gilg, Kamerun; *P. Zenkeri*, Kamerun; *P. cinnabarina*, Kamerun; *P. lancea*, Kamerun; *Byrsocarpus Ledermannii*, Kamerun; *B. tomentosus*, Dutch East Africa, Rodesia, etc.; *B. papillosus*, Kamerun; *Santaloides urophyllum*, Kamerun; *Jollydora glandulosa*, Kamerun. New combinations are as follows: *Cnestis Mannii* (*Connarus Mannii* Baker); *C. pseudoracemosa* (*Connarus pseudoracemosus* Gilg); *Roureopsis Thonneri* (*Rourea Thonneri* De Wild.); *Spiropetalum Reynoldsii* (*Connarus Reynoldsii* Stapf); *Santaloides gudjuanum* (*Rourea gudjuana* Gilg); *S. splendidum* (*Rourea splendida* Gilg); *S. baman-gense* (*Rourea bamanganense* De Wild.). Notes are given on *Paxia myriantha* (Baill.) Pierre, *Byrsocarpus orientalis* Baill., *B. Poggeanus* (Gilg) Schellenb., and *B. maximus* Bak.—K. M. Wiegand.

535. SCHELLENBERG, G. Ueber die Connaraceen-Gattung *Jaundea* Gilg. [On the genus *Jaundea* Gilg of the family Connaraceae.] *Bot. Jahrb.* 55: 457-463. 1919.—GILG described in 1895 a genus *Jaundea* based on a plant which he named *J. Zenkeri* collected by ZENKER near the station Jaunde in Kamerun. The new genus was included in *Natur. Pflanzenfam.* where in one place it was spelled *Yaundea*, an unjustifiable spelling of the word. GILG admitted later that he was deceived by the young inflorescence and the position of the anthers in the ZENKER material, and that his name should be a synonym of *Rourea pseudobaccata*. Later SCHELLENBERG in his inaugural dissertation made *Jaundea* a section of *Byrsocarpus*; but he now recognizes it as a genus containing the original plant of GILG, but having different characters and limits. As thus understood it contains a portion of the species originally ascribed by SCHELLENBERG to *Jaundea* as a section of *Byrsocarpus*. The unimportance of certain biological characters from a taxonomic point of view is discussed, as for instance the appearance of the flowers with or after the leaves. The nervation of the leaf and the type of inflorescence are important in separating *Jaundea* and *Byrsocarpus*. A diagnosis of the genus is given and the characters which separate it from *Byrsocarpus* are tabulated. The species and forms included are as follows: *Jaundea Baumannii* (*Rourea Baumannii* Gilg); *J. congolana*; *J. Leskrauwaetii* (*Rourea Leskrauwaetii* De Wild.); *J. monticola* (*Rourea monticola* Gilg); *J. Oddoni* (*Rourea Oddoni* De Wild.); *J. pseudobaccata* (*Rourea pseudobaccata* Gilg); *J. pubescens* (*Connarus pubescens* Baker); *J. pubescens* forma *glabrata*.—K. M. Wiegand.

536. SCHLECHTER, R. Die Gattung *Cochlioda* Ldl. [The Genus *Cochlioda* Ldl.] *Orchis* 13: 3-10. 1919.—(Concluded.) An extensive generic description is followed by a key to the five recognized species of *Cochlioda*. Specific descriptions, synonymy, and the citation of specimens are included. *Symphyglossum* is described as a genus new to science, and to it are assigned the following species: *S. sanguineum* (*Mesospinidium sanguineum* Rchb. f.) and *S. strictum* (*Cochlioda stricta* Cogn.).—E. B. Payson.

537. SCHLECHTER, R. Noch einmal über *Epidendrum pentotis* Rchb. f. und *Epidendrum Beyrodtianum* Schltr. [Again concerning *Epidendrum pentotis* Rchb. f. and *Epidendrum Beyrodtianum* Schltr.] *Orchis* 13: 27-29. 1919.—The difference between these two similar species is reiterated, and drawings are presented to show the floral structure of *E. pentotis* Rchb. f.—E. B. Payson.

538. SCHLECHTER, R. *Oncidium* $\times$ *Burgeffianum* Schltr., eine interessante neue Kreuzung. [*Oncidium* $\times$ *Burgeffianum* Schltr., an interesting new hybrid.] *Orchis* 13: 29-30. 1919.—This hybrid has for its parents *Oncidium Marshallianum* Ldl. and *O. varicosum* Ldl.—*E. B. Payson*.

539. SCHLECHTER, R. *Vandanthe Tatzteri* Schltr. n. hybr. *Orchis* 13: 52-53. 1919.—A hybrid between *Vanda tricolor* Ldl. and *Euanthe Sanderiana* (Rehb. f.) Schltr. is described and illustrated.—*E. B. Payson*.

540. SCHLECHTER, R. Ein seltenes *Grammatophyllum*. [A rare *Grammatophyllum*.] *Orchis* 13: 54-55. 1919.—*Grammatophyllum papuanum* J. J. Smith is described and illustrated.—*E. B. Payson*.

541. SCHLECHTER, R. Die Gattung *Brassavola* R. Br. [The Genus *Brassavola* R. Br.] *Orchis* 13: 40-46, 58-62, 71-79. 1919.—The genus *Brassavola* is described, and an outline of its taxonomic history given with notes as to its geographical distribution. The sections *Eubrassavola*, *Prionoglossum*, *Conchoglossum* and *Cuneilabium* are proposed and under each section are listed their species with descriptions and synonymy. The following new species are described and new combinations made: *B. multiflora*, *B. nodosa* Lindl. var. *rhopalorrhachis* (*B. rhopalorrhachis* Rehb. f.), *B. scaposa*.—*E. B. Payson*.

542. SEDGWICK, L. J. The Cyperaceae of the Bombay Presidency, Part II. *Jour. Bombay Nat. Hist. Soc.* 26: 192-209. 1918.—A general systematic consideration with keys and descriptions of the genera and species, covering the genera *Courtoisia*, *Fimbristylis*, *Stenophyllum*, *Eleocharis*, *Scirpus*, *Eriophorum*, *Fuirena*, *Lipocarpa*, *Remirea*, *Rhyncospora*, *Hypolytrum*, *Scleria*, *Carex*. The first part was published in the preceding volume. No new names appear.—*E. D. Merrill*.

543. SEDGWICK, L. J. Reduction of *Euphorbia Rothiana* Sprengel, of the Indian floras. *Jour. Bombay Nat. Hist. Soc.* 26: 599-600. 1919.—The above Indian species, as hitherto interpreted, is referred in part to *Euphorbia laeta* Roth and in part to *E. oreophila* Miq.—*E. D. Merrill*.

544. SEDGWICK, L. J. On the species of *Zizyphus* in the Bombay Presidency. *Indian Forester* 45: 67-74. 1919.—Critical notes on seven species of *Zizyphus* occurring in India are given, with characteristics for field identification and distribution. Two forms of *Z. Oenoplia* Mill. are distinguished as forma *robusta* and forma *mollis*. *Z. Xylopyrus* Willd. var. *glaberrima* is tentatively proposed as a new variety. The suggestion is made that *Z. Xylopyrus* Willd. var. *micocarpa* may be a hybrid between *Z. Jujuba* and *Z. Xylopyrus*.—*E. N. Munns*.

545. SHREVE, FORREST. Monograph of the Cactaceae. [Rev. of: BRITTON, N. L., and J. N. ROSE. The Cactaceae; descriptions and illustrations of plants of the cactus family. Vol. I. Carnegie Inst. [Washington] Publ. 248. 1919.] *Plant World* 22: 270-271. 1919.

546. SPRAGUE, T. A. *Dolichandrone* and *Markhamia*. *Bull. Misc. Inf. Kew* 1919: 302-314. 1919.—These bignoniaceous genera are contrasted, and under each genus are listed the species attributed to it. Detailed synonymy together with distributional and ecological notes is included for the various species. The following new combinations and new variety occur: *Dolichandrone atrovirens* (*Bignonia atrovirens* Heyne), *D. alba* (*Spathodea alba* Sim.), *Markhamia stipulata* Seem. var. *Kerrii*, *M. obtusifolia* (*Dolichandrone obtusifolia* Baker).—*E. Mead Wilcox*.

547. STAFF, O. *Gunnera manicata* and *brasiliensis*. *Bull. Misc. Inf. Kew* 1919: 376-378. 1919.—*Gunnera brasiliensis* Schindler is considered synonymous with *G. manicata* Lindl.—*E. Mead Wilcox*.

548. STAFF, OTTO. *Gramineae*. Flora of Tropical Africa 9⁴: 577-768. 1920.—This part continues the Paniceae as far as *Setaria*. The new genera, species and varieties in this part are as follows: *Paspalidium* (new genus) *geminatum* (*Panicum geminatum* Forsk.), *P. desertorum* (*Panicum desertorum* A. Rich.), *Urochloa bifalcigera* (*Panicum bifalcigerum* Stapf), *U. trichopus* (*Panicum trichopus* Hochst.), *U. pullulans* (*Panicum geminatum* Schweinf. not Forsk.), *U. pullulans* var. (?) *mosambicensis* (*Panicum mosambicense* Hack.), *U. brachyura* (*Panicum brachyurum* Hack.), *U. bolbodes* (*Helopus bolbodes* Steud.), *U. echinolaenoides*, *U. Helopus* (*Panicum Helopus* Trin.), *U. javanica* (*Panicum javanicum* Poir.), *U. rudis*, *U. setigera* (*Panicum setigerum* Retz.), *U. insculpta* (*Panicum insculptum* Steud.), *U. reptans* (*P. reptans* L.). *Echinochloa obtusiflora*, *E. Holubii* (*Panicum Holubii* Stapf.), *E. haploclada* (*Panicum haplocladum* Stapf), *E. jubata*, *Acroceras* (new genus) *oryzoides* (*Panicum oryzoides* Sw.), *A. macrum*, *A. amplexens*, *A. basycladum*, *Commelinidium* (new genus) *mayumbense* (*Panicum mayumbense* Franch.), *C. gabunense* (*Panicum gabunense* Hack.), *C. nervosum*, *Panicum flacciflorum*, *P. transvenulosum*, *P. spongiosum*, *P. ianthum*, *P. juncifolium*, *P. carinifolium*, *P. fulgens*, *P. nervatum* (*Isachne nervata* Franch.), *P. pubiglume*, *P. plagianthum*, *P. sublaetum* (*P. laetum* Stapf, not Kunth), *P. viciniflorum*, *P. filicaule*, *P. Hanningtonii*, *P. phragmitoides*, *P. poaeoides*, *P. graniflorum*, *P. vagiflorum*, *P. poecilanthum*, *P. aphanoneurum*, *P. Rowlandii*, *P. genuflexum*, *P. paucinode*, *P. manicatum*, *P. sociale*, *P. novemnerve*, *P. arcurameum*, *P. subflabellatum*, *P. longijubatum*, *P. pectinellum*, *P. calvum*, *P. subobliquum*, *P. caudiglume* [not Hack. 1901], *P. microthyrsum*, *Entolasia* (new genus) *imbricata*, *E. olivacea*, *Hemigymnia* (new genus) *Arnottiana* (*Panicum Arnottianum* Nees), *Cyrtococcum* (new genus) *setigerum* (*Panicum setigerum* Beauv.), *Sacciolepis ciliocincta*, (*Panicum ciliocinctum* Pilg.), *S. cingularis*, *S. nana*, *S. Chevalieri*, *S. brevifolia*, *S. huillensis* (*Panicum huillense* Rendle), *S. spiciformis* (*Panicum spiciforme* Hochst.), *S. interrupta* (*Panicum interruptum* Willd.), *S. cymbiandra*, *S. scirpioides*, *S. glaucescens*, *S. typhura* (*Panicum typhurum* Stapf), *S. incurva*, *S. transbarbata*, *S. auriculata*, *S. angusta* (*Panicum angustum* Trin.), *S. leptorrhachis*, *S. seslerioides* (*Panicum seslerioides* Rendle), *S. catumbensis* (*Panicum catumbense* Rendle), *S. albidula*.—A. S. Hitchcock.

549. STUCKERT, T. *Contributions a la connaissance de la flore Argentine*. [Contributions to the knowledge of the flora of Argentina.] *Annuaire Conservatoire et Jard. Bot. Genève* 20: 428-464. 1919.—This consists of two parts. The first part is, *III. Énumération des Valérianiacées de l'Argentine* by STUCKERT and BRIQUET. The new names by BRIQUET are, *Valeriana sarscephylla* (Stuckert 7622a), *V. effusa* var. *genuina* (Stuckert 1037 and others), var. *Fiebrigii* (Bolivia, Fiebrig 2196), *V. approximata* (Tucuman, Stuckert 22022), *V. Gilliesii* (*Betckea Gilliesii* Hook. & Arn.), *V. glomerulosa* (Tucuman, Stuckert 7637), *V. Stuckertii* (Stuckert 2749 and others). The second part is, *IV. Catalogue des Oxalidacées de l'Argentine* by Stuckert. *Oxalis andicola* var. *Wallichiana* (*O. andicola* var. *calyce glabriusculo* Hook.) is a new variety. There is an annotated list with bibliography of 82 species of *Oxalis* and 3 species of *Hypseocharis*.—A. S. Hitchcock.

550. TATZER, A. *Vanda × Mariannae*, eine Kreuzung zwischen *Vanda tricolor* Lindl. und *Vanda Denisoniana* Rchb. f. [*Vanda × Mariannae*, a hybrid between *Vanda tricolor* Lindl. and *Vanda Denisoniana* Rchb. f.] *Orchis* 13: 50-51. 1919.—This hybrid is here described and illustrated.—E. B. Payson.

551. TURRILL, W. B. A revision of the genus *Mendoncia*. *Bull. Misc. Inf. Kew* 1919: 407-424. 1919.—This Central and South American genus is contrasted with related genera of the Acanthaceae by means of a dichotomous key. Twenty-five species are recognized, and under each is given an extended Latin diagnosis with citation of exsiccatae. A key to the species is also provided. The following species and varieties are described as new and the following new combinations made: *Mendoncia Spraguei*, *M. Tonduzii*, *M. coccinea* Vell. var. *sparatteria* (*M. Velloziana* Nees var. *sparatteria* Nees), *M. coccinea* var. *elliptica*, *M. gracilis*, *M. orbicularis*, *M. retusa*.—E. B. Payson.

MISCELLANEOUS, UNCLASSIFIED PUBLICATIONS

BURTON E. LIVINGSTON, *Editor*

552. ANONYMOUS. Microscoptical optics. [From a paper by A. E. CONRADY at a discussion on the microscope at the Royal Society on Jan. 14.] *Nature* 104: 548-550. 1920.

553. ANONYMOUS. Peat fiber and the textile industry. *Jour. Amer. Peat Soc.* 13: 350. 1920.

554. ANONYMOUS. [Rev. of: ALCOCK, W. BROUGHTON. *Canvas destroying fungi*. *Journ. Roy. Army Med. Corps* 32^o. Dec., 1919.] *Jour. Trop. Med. and Hygiene* 23: 41. 1920.—Researches in Malta and Italy show that the rotting of canvas is due to various fungi, but chiefly to species of *Macrosporium* and *Stemphylium*.—E. A. Bessey.

555. BARNARD, J. E. Construction and use of microscopes. *Nature* 104: 546-548. 1920.—Opening paper of a discussion on the microscope at the Royal Society on Jan. 14. Most microscopes are unstable. An object on the stage will not maintain its centration if the instrument is put into the horizontal. Imperfections in mechanical stages are general. Resolution, not magnification, is the primary function of an objective. No indication that numerical aperture will be further increased, but advances in illumination, especially by use of ultra-violet or perhaps still shorter radiations, may be hoped for. (See also *Bot. Absts.* 3, Entry 3033.)—O. A. Stevens.

556. BROWN, A. M. Faults found in butter. Their definitions, causes and some suggested remedies for same. *Agric. Gaz. New South Wales* 31: 490-494, 591-595. 1920.—Author discusses relation of certain bad characters found in butter to bacteria and fungi causing them.—L. R. Waldron.

557. DEELEN, H. Peat fiber spinning. *Jour. Amer. Peat Soc.* 13: 452. 1920.—German patent 316,511 covers the preparation from peat of fibers suitable for use with wool, cotton, or jute.—G. B. Rigg.

558. DUGGAR, B. M. Some factors in research. *Plant World* 22: 277-289. 1919.—A paper contributed to a symposium on the general topic "Our present duty as botanists," in Baltimore, 1918. Various factors are discussed, such as the establishment of research positions in connection with industrial enterprises, extension of opportunities to use special apparatus during vacation periods, conferences of groups of investigators interested in related problems, fostering post-doctorate and sabbatical-leave research, co-operation in publication and other activities, etc. It closes with a plea for better preparation, particularly in chemistry, for botanical research.—Charles A. Skull.

559. FISCHER, HERMAN. Der Nährstoffgehalt unserer Gewässer und seine Ausnützung für die Urproduktion. [The nutrient content of our waters and its use as an original productive factor.] *Naturwiss. Zeitschr. Forst- u. Landw.* 18: 66-83. 1920.—Agriculture has received too little study in the past when compared with its relative economic importance. The author discusses previous studies in this field, and dwells particularly on the relation of nitrogen, phosphoric acid, and potassium as found in fresh and salt waters to aquatic life, vegetative and piscatorial. Nitrogen and P_2O_5 are similar in salt and fresh water. In rivers, lakes, and other small natural bodies, the quantity of nutrients, especially of P_2O_5 is greatly influenced by the character of the soil surface, quantity of precipitation, etc. The humus coloring of water is a direct indication of the P_2O_5 content; and in general, all waters of limestone formations contain little, those over sandstone plentiful P_2O_5 . Although further experimentation is necessary, it is believed that increased P_2O_5 content in natural waters can be used in securing greater fish production; also, as the floor decreases in nitrogenous compounds, an increase in nitrogen is necessary to keep up production. The rela-

tion of potassium in natural waters varies inversely as that of P_2O_5 . Lime plays an important rôle indirectly in increasing the content of the other three nutrients, by replacing them in chemical reactions and releasing them for use as solutes. The article contains 2 tables giving analyses of waters, both basic and acidic, of inland lakes and tributaries.—*J. Roeser.*

560. MACINNES, L. T., AND H. H. RANDELL. Dairy produce factory premises and manufacturing processes. The application of scientific methods to their examination. *Agric. Gaz. New South Wales* 31: 563-566. 9 fig. 1920.—In this fourth and last installment under this title the authors make an agar plate examination of dairy produce, its containers, and the environment in a modern and finely constructed dairy plant. Results are in striking contrast to those found in other plants in which less attention had been paid to sanitary conditions. In a plant such as this, pasteurization results are not discounted by insanitation.—*L. R. Waldron.*

561. MACINNES, L. T., AND H. H. RANDELL. Dairy produce factory premises and manufacturing processes. The application of scientific methods to their examination. *Agric. Gaz. New South Wales* 31: 485-489. 7 fig. 1920.—This article gives in some detail the results of bacterial and fungal counts, qualitative and quantitative, of samples taken at different stages of manufacture of dairy products, of their containers, and of the general environment found in one factory. The conclusion to be drawn is that lack of scientific sanitary management and control is responsible for much financial loss and probable injury to health.—*L. R. Waldron.*

562. RADER, F. E. Report of the work at Matanuska station. *Rept. Alaska Agric. Exp. Sta.* 1917: 81-84. 1 pl. 1919.—Reports on preliminary work, including the clearing of the land.—*J. P. Anderson.*

563. SAUNDERS, CHARLES FRANCIS. Useful wild plants of the United States and Canada. 275 p., 16 pl., 74 fig. Robert M. McBride & Co.: New York, 1920.—A popular treatise dealing with native plants, especially those useful for food, but also considering those that are used for beverages, for soap substitutes, and for medicine, besides mentioning certain poisonous plants. The book is written in an attractive style, and the information it contains is selected with care.—*C. V. Piper.*

564. STOLL, FRANK. [Rev. of: PELLETT, FRANK C. *American honey plants.* 297 p., 155 fig. *American Bee Journal*, Hamilton, Ill. 1920.] *Torrey* 20: 104. 1920.—The book describes as valuable because of nectar or pollen production some 900 species, arranged alphabetically by common names, with Latin names accompanying the vernacular. The book is timely on account of the present sugar shortage.—*J. C. Nelson.*

565. WALLIS, T. E. Analytical microscopy. *Pharm. Jour.* 104: 247-249, 349-351, 395-397, 541-542, 578-579; *IDEM.* 105: 159-160, 283-284. 1920.

